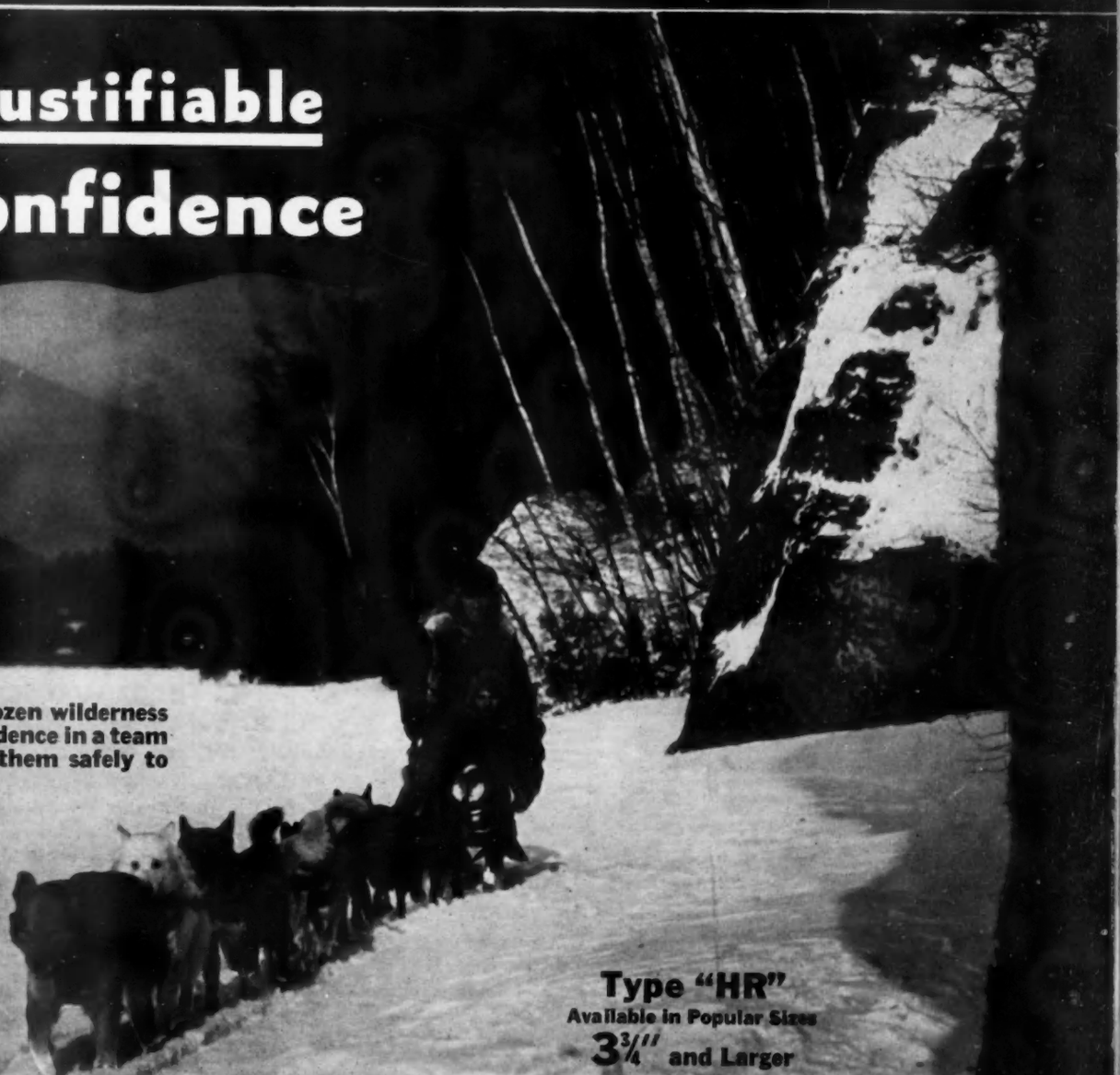
. . . with Justifiable Confidence



Years of travel in frozen wilderness have given men confidence in a team of "Huskies" to see them safely to journey's end . . . .

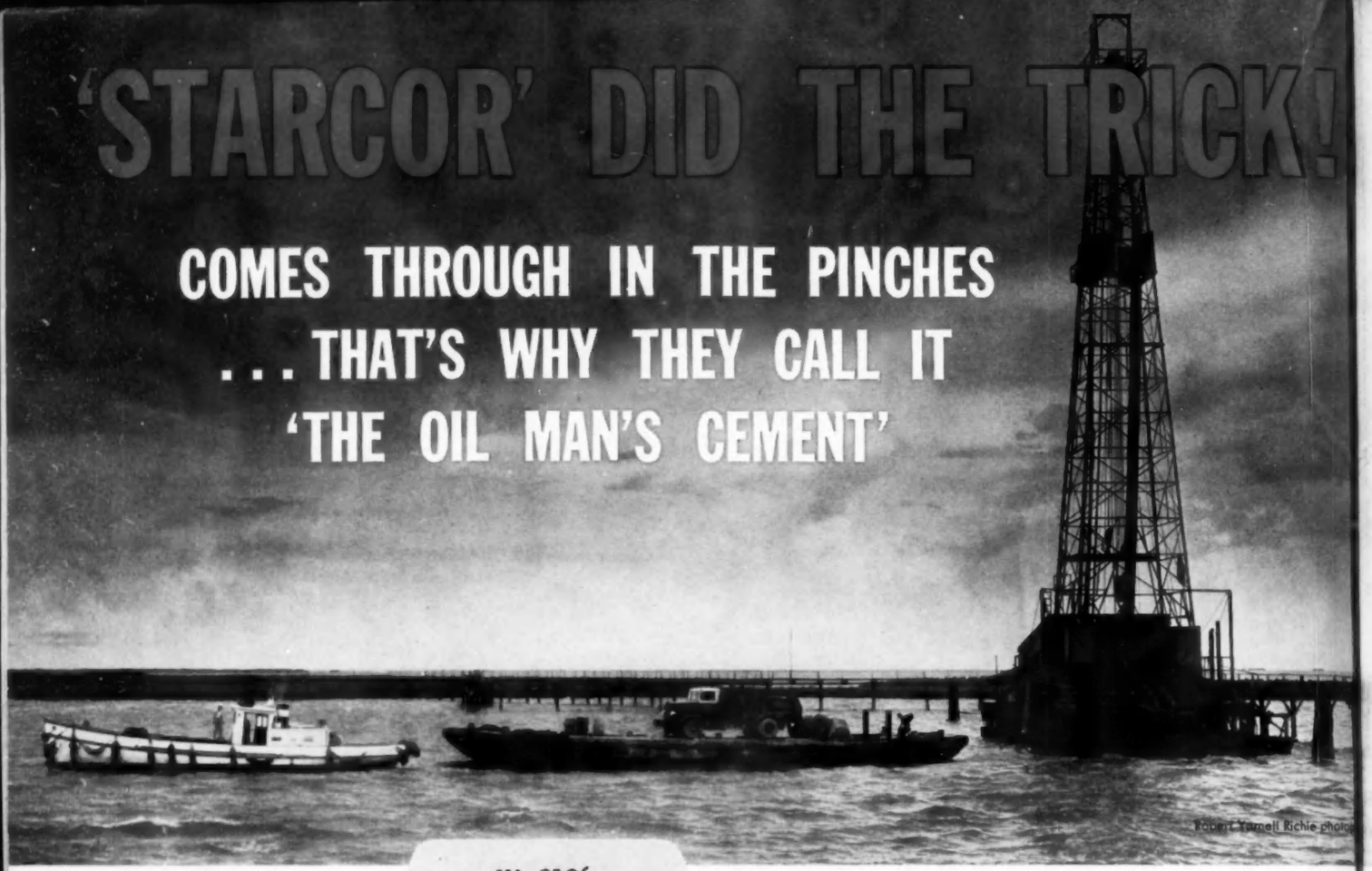
Type "HR"
Available in Popular Sizes
3¾" and Larger

Hughes Rock Bits, through more than three decades of dependable service, have earned the confidence of the Drilling Industry. Operators know they can depend on Hughes Rock Bits for maximum footage of straight, full-gage hole.

HUGHES TOOL COMPANY • HOUSTON TEXAS

'STARCOR' DID THE TRICK!

COMES THROUGH IN THE PINCHES ... THAT'S WHY THEY CALL IT 'THE OIL MAN'S CEMENT'



Mi-2196

FIELD:	Lake Pelto, Louisiana
TYPE OF JOB:	Casing; 7" O.D., 9-5/8" hole
DEPTH OF WELL:	5,500 feet
MAX. TEMP.:	150° F.
SLURRY WEIGHT:	16 lbs. per gal.
CEMENT USED:	'Starcor' - 400 sacks
MIXING TIME:	18 minutes
PUMPING-DOWN TIME:	27 minutes
MAX. PUMP. PRESSURE:	1800 lbs.
REMARKS:	Mud weight, 10 lbs. per gallon; circulation broke at 900 lbs; well was circulated 1 hr. 20 min. prior to cementing... Another successful 'Starcor' job under unusual and difficult conditions.

SCATTERED over Terrebonne Bay, in Iberia Parish, La., are a number of domes, all producing oil. The wells are not very deep, but formations are so soft that holes are almost always crooked. This combination produced plenty of grief—until they switched to 'Starcor'. 'Starcor' did the trick, like the Oil Man's cement that it is. See typical job-log, at left.

'Starcor' is made to measure for oil-field service, through continuing research, at the drilling rig and in our oil-well cement research laboratory. Use 'Starcor'* for deep wells—greater length and ease of pumpability at high temperatures, extra sulphate resistance. Use 'Incor'* for wells of moderate depth—earlier drill-out, wells on production quicker. Insist on 'Starcor' or 'Incor'—it'll pay you well.

*Reg. U. S. Pat. Off.

LONE STAR
CEMENT CORPORATION

DALLAS: Santa Fe Building . . . . HOUSTON: Shell Building

USE 'STARCOR' for deep wells, greater length and ease of pumpability at high temperatures, and extra sulphate resistance.

USE 'INCOR' for wells of moderate depth—earlier drill-out, wells on production quicker.

Doubles Belt Life ON 4,100′ PULL!

Two years was the maximum life for belts on a large company's well in the Seminole field. This beam pump drive pulls a load of some 22,000 lbs. — 900 barrels a day — from a depth of 4,100 ft. A tough job for any belt!

But the G. T. M. — Goodyear Technical Man — had the answer. He specified a truly endless Goodyear COMPASS "800," double-deck, designed for the heaviest duty oil pumps.

That belt served just a few days less than four years — nearly twice as long as the best previous belt. And during all that time the drive never once shut down for take-up. There was no stretch, no loss of production. So naturally, the replacement belt was a Goodyear COMPASS.

Why not let the G.T.M. point out to you the patented COMPASS features which have established similar records on so many other hard drives. To bring him to your rig, write Goodyear, Akron, Ohio, or Los Angeles, California — or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

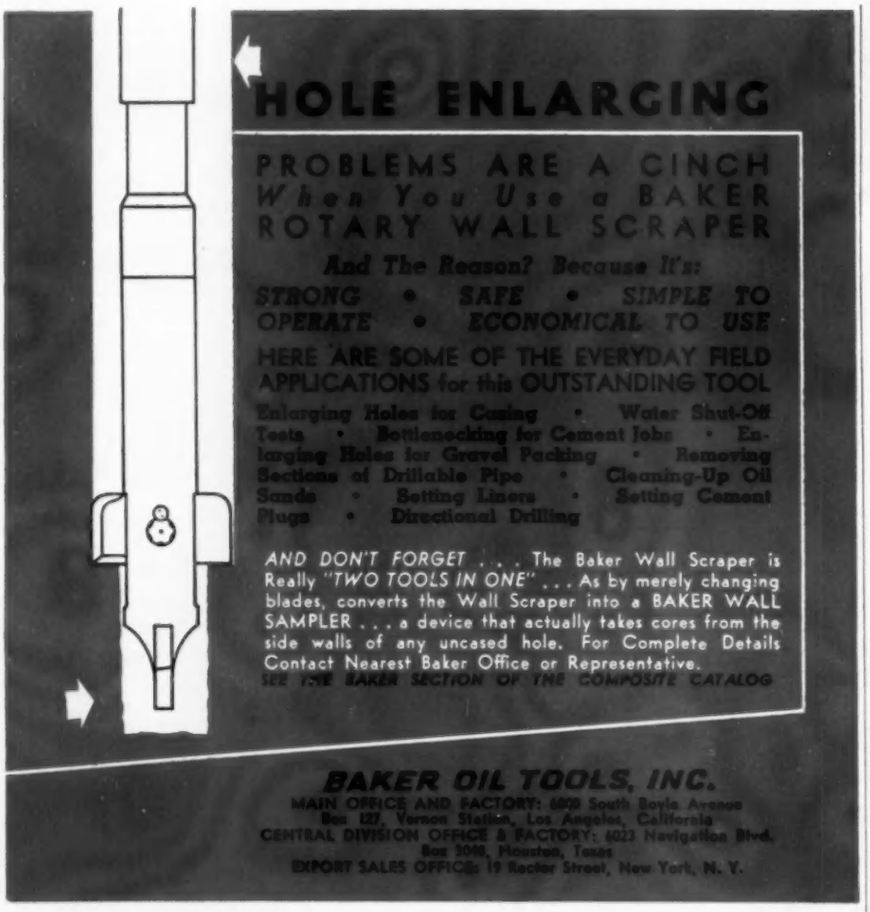
Compass—T. M. The Goodyear Tire & Rubber Company

THE GREATEST NAME IN RUBBER

GOODYEAR

GTM-Specified
GOODYEAR COMPASS No. 800 BELT
99′ long x 14″ wide
truly endless
for BEAM-PUMP DRIVE

50 HP. MOTOR
BELT SPEED: 1,100 F.P.M.


HOLE ENLARGING
PROBLEMS ARE A CINCH
When You Use a BAKER
ROTARY WALL SCRAPER
And The Reason? Because It's:
STRONG • SAFE • SIMPLE TO OPERATE • ECONOMICAL TO USE
HERE ARE SOME OF THE EVERYDAY FIELD APPLICATIONS for this OUTSTANDING TOOL
Enlarging Holes for Casing • Water Shut-Off Tests • Bottlenecking for Cement Jobs • Enlarging Holes for Gravel Packing • Removing Sections of Drillable Pipe • Cleaning-Up Oil Sands • Setting Liners • Setting Cement Plugs • Directional Drilling
AND DON'T FORGET . . . The Baker Wall Scraper is Really "TWO TOOLS IN ONE" . . . As by merely changing blades, converts the Wall Scraper into a BAKER WALL SAMPLER . . . a device that actually takes cores from the side walls of any uncased hole. For Complete Details Contact Nearest Baker Office or Representative.
SEE THE BAKER SECTION OF THE COMPOSITE CATALOG
BAKER OIL TOOLS, INC.
MAIN OFFICE AND FACTORY: 6023 South Boyle Avenue
Box 127, Vernon Station, Los Angeles, California
CENTRAL DIVISION OFFICE & FACTORY: 6023 Navigation Blvd.
Box 3068, Houston, Texas
EXPORT SALES OFFICE: 19 Rector Street, New York, N. Y.

OIL AND GAS LEASES AND ROYALTIES

By SAMUEL H. GLASSMIRE,
Member of the Tulsa, Oklahoma, Bar

Enlarged, rewritten and rearranged and divided into Chapters and Sections covering more than one hundred separate topics. A practical legal treatise on Petroleum Rights, Accruing by Virtues of Oil and Gas Leases and Royalty Conveyances.

Part I—Production of Petroleum
Chapter 1—Oil Fields and Production Methods
" 2—New Conception of Oil Production
" 3—Evolution of the Oil and Gas Lease
" 4—Oil and Gas Royalties

Part II—Estates on Oil and Gas
Chapter 5—Oil and Gas Rights
" 6—Theories of Ownership
" 7—Estates Created by Acts of Parties
" 8—Estates Created by Operation of Law

Part III—Law of Oil and Gas Leases
Chapter 9—The Commercial Lease
" 10—Bonus and Term Clauses
" 11—Rentals
" 12—Royalties
" 13—Implied Covenants and Forfeiture
" 14—Public and Quasi-Public Lands and Leases
" 15—Indian Lands and Leases
" 16—Rights of Lessors
" 17—Conveyances by Lessors
" 18—Rights of Lessees
" 19—The Oil Trade Structure
" 20—Taxation

Fabrikoid Cover — 467 Pages — Price: $10.00

Send orders to the
GULF PUBLISHING COMPANY
P. O. Drawer 2608, Houston, Texas

Looking Ahead
WITH THE EDITOR

WIRE ROPE used as rotary drilling line is a specially designed product consisting of 115, 117 or maybe 119 different parts. It is a combination of various parts so designed that when all are assembled as a single unit they will work together to produce a specific result, and therefore wire rope fulfills the dictionary's definition of a machine.

But how frequently does wire rope receive the care and attention in the oil fields that we give to machines? Is it kept free of mud and moisture, or properly lubricated, or correctly spooled, or protected against kinking and excessive bending? Admittedly, it is seldom given such care. How many of us have not seen rope unwound by whatever convenient method is best suited to the occasion, or dropped from a truck and otherwise abused in a fashion we would not think of subjecting a machine to?

Oil operators should realize that while wire rope is rugged in make-up, it is still a delicate machine. Its ultimate performance depends to a very great extent on its treatment during installation and throughout its period of service. Yet in practically every oil field it is possible to observe rope treated like the stepchild it decidedly is not. Wire rope is a working wage-earning member of the family, and should be treated with respect—or it will go haywire some day and do more than slap us in the face when it breaks. Proper handling of wire rope will pay large dividends, and this is to be stressed in an article prepared for publication in an early issue of THE OIL WEEKLY.

While practical experience knowledge varies greatly with each job, each operation and each method of handling, there are some established recommendations in applying the correct rope for the particular job and for gaining the utmost in service with the greatest economy.

The OIL WEEKLY, published every Monday. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879.

THE OIL WEEKLY

ENGINEERING « NEWS » STATISTICS

EDITORIAL STAFF
WARREN L. BAKER
Editor
J. KENT RIDLEY
Managing Editor

ASSOCIATE EDITORS
L. J. LOGAN — BRAD MILLS
WM. V. GROSS

DISTRICT EDITORS
B. F. LINZ.....Washington
BEN ALTMAN, FRANK TAYLOR.....Tulsa
H. H. KING.....Fort Worth
EARL S. POST.....San Antonio
R. W. BYRAM.....Austin
WM. H. STRANG, Z. H. MISCHKA, ELTON STERRETT.....Houston

PUBLISHED BY
THE GULF PUBLISHING COMPANY
HOUSTON, TEXAS

R. L. DUDLEY, *President*
A. L. BURNS, *General Manager*
S. W. ROBINSON, *Editorial Director*
TOM W. NELSON, *Advertising Manager*

Staff correspondents at all important points.

Member Audit Bureau of Circulation
Member Associated Business Papers, Inc.

BRANCH OFFICES
NEW YORK.....250 Park Ave.
PITTSBURGH.....Vandergrift Bldg.
CHICAGO.....332 S. Michigan Ave.
LOS ANGELES..W. W. Wilson Bldg., Huntington Park, Calif.
TULSA.....Hunt Bldg.
FORT WORTH..W. T. Waggoner Bldg.
SAN ANTONIO.....Smith Young Tower Bldg.
WASHINGTON.....Albee Bldg.

ADVERTISING STAFF
DICK SWINSKY.....New York
C. A. WARDLEY.....Pittsburgh
H. G. FITZPATRICK.....Chicago
J. F. CARTER, JR.....Tulsa
JAY CURTS, JR.....Los Angeles
CHAS. WYATT.....Houston

CIRCULATION DEPARTMENT
J. T. WAGONER.....Manager

SPECIALIZED OIL JOURNALS
Published by
THE GULF PUBLISHING COMPANY

The Oil Man's Calendar

1941	
JAN.	
16–17	**Liquefied Petroleum Gas Association, Eastern Section, New York.**
FEB.	
22	**American Institute of Mining & Metallurgical Engineers, New York.**
22	**North Texas Oil & Gas Association, Wichita Falls.**
24–25	**Liquefied Petroleum Gas Association, Chicago.**
27–28	**American Petroleum Institute, Division of Production, Southwestern District, Shreveport.**
MAR.	
11	**American Petroleum Institute, Division of Production, Spring Meeting, Pacific Coast District, Los Angeles.**
APR.	
1– 3	**Society of Exploration Geophysicists, Houston.**
2– 4	**American Association of Petroleum Geologists, Twenty-sixth Annual Meeting, Houston.**
7–11	**American Chemical Society, St. Louis.**
16–18	**Western Petroleum Refiners Association, Hot Springs, Ark.**
17–18	**American Petroleum Institute, Division of Production, Eastern District, Pittsburgh.**
23–25	**Petroleum Industry Electrical Association, Tulsa.**
23–25	**Natural Gasoline, Association of America, Dallas.**
25–26	**National Petroleum Association, Cleveland.**

Contents « January 13, 1941

Volume 100, Number 6

The Changing Panorama..... 9

Feature Section:

Drilling During December Near High Point for Year... 10

Stratigraphic Traps Source of Major Production Over Central Kansas Uplift..... 13
BY JOSEPH A. KORNFELD

Separate Units Aid Wire Line Coring..... 20

Get the Rig in Shape While Cement Is Setting..... 22

Preventing Paraffin Formation by Air Control..... 24
BY F. R. COZZENS

Up-Ended Boiler Makes Pressure Treater for Crude..... 28

Determination of Factors Affecting Reservoir Performance..... 33
BY M. MUSKAT

News Section and Index..... 43

Looking Ahead With the Editor..... 2

Notes for the Equipment Buyer and User..... 67

Squeaks From the Bull Wheel..... 71

Index to Advertisers..... 72

Published every Monday. Single Copies 15 cents (Special Issues 50c). Subscription price: domestic and foreign, $2.00 a year; 2 years $3.00. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879. Subscription restricted to those engaged in the producing and pipe line branches of the oil industry or the manufacturing and distribution of oil field supplies. Advertising rates on application.

Copyrighted 1941 by The Gulf Publishing Company.

We're Betting on Your Operators with "BLUE CHIPS"

"Blue Chips" is a bulletin sent regularly by the Service Bureau of Warner & Swasey, directly to turret lathe operators. Written in "shop language," these bulletins are full of practical ideas and suggestions to help men become better operators of turret lathes. Valuable contributions are sent in by operators all over the country. These men are finding better ways of turning metal, and want to pass along their experience. So we publish these ideas in "Blue Chips."

Today, when top production is urgent—skilled men scarce—and deliveries of new turret lathes delayed, the training of operators assumes greater importance than ever before.

Send for sample copies of "Blue Chips." Look them over and if you wish your operators to receive these bulletins regularly without cost to them or to you, send us their names and home addresses. Write

WARNER & SWASEY
Operator Service Bureau 405, Cleveland, Ohio

Gentlemen: We are interested in your offer to send "Blue Chips" to our turret lathe operators without charge and would like to see sample copies.

Name _____

Company _____

Address _____

WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

THE OIL WEEKLY

JANUARY 13, 1941

VOLUME 100 NUMBER 6

The Changing Panorama

Oil Legislation . . .

The oil industry of the United States, beset for several years with an increasing severity and number of attacks from the federal government, will find no let up of such activities during the present 77th Congressional session if recent actions are true indicators of probable legislation considerations.

Of course, most important is the prospect for a determined effort of the administration to procure federal regulation or control of the industry. However, the industry also will be enmeshed in other governmental controversies, for reintroduction of a number of oil measures which were pending last year marked the opening of the 77th Congress.

Most important from the standpoint of the industry are three bills providing for disintegration. Three bills have been introduced: in the Senate, by Senator Guy M. Gillette, and in the House, by Representative Vincent F. Harrington, both from the non-oil-producing state of Iowa, calling, respectively, for the divorce of marketing, divorce of pipe lines and divorce of tanker and barge operations from other branches of the industry.

The pipe line and marketing divorce bills were sponsored by the same two Iowa members last session, but the tanker-barge bill is new, although along the same lines. The two former bills were responsible to a large degree, for the investigation made last year by the Temporary National Economic Committee, popularly known as the monopoly committee, before whom it is estimated that something like 1,750,000 words, nearly 400 exhibits, and approximately 40 witnesses told the story of oil.

Joint resolutions to declare the policy of the United States with regard to tidal and offshore submerged lands have been introduced by Representatives Homer D. Angell of Oregon and Lee E. Geyer of California. Thus the matter of offshore ownership is to be considered again by Congress also.

Representative Hatton W. Sumners of Texas reintroduced his bill providing for an embargo against importation into the United States of property confiscated in any foreign country without payment of just compensation to the owners.

Bills providing for the sales taxes of fuel oil, a pollution bill, a chain-store tax bill that eliminates the exemption of filling stations, and a bill requiring the blending of alcohol with gasoline have been introduced.

Distillate Proration . . .

Another oil paradox is the present action designed to check further expansion of recycling operations by certain elements in the industry. It is contended that production from distillate fields has risen to such a point as to seriously affect crude-oil allowables from other areas and that any additional production of this type will upset the whole proration situation.

Recycling sprang into prominence with the discovery of a number of deep, high-pressure fields that required a combination gasoline recovery and repressuring plant to efficiently handle the distillate production without tremendous physical and economic waste. Such operations were widely heralded as the last word in operating efficiency as well as conservation, because a maximum of recovery is obtainable and the full value of the reservoir energy is realized by maintaining pressures and returning the gas to the formation again and again.

However, recycling methods are expensive and if a reasonable return is to be had on the large investment, it is necessary for the plants to operate at maximum capacity. This means that allowables in these high-pressure distillate fields have been uniformly higher than in other producing areas. This coupled with the fact that a barrel of production from a distillate field is equivalent to three barrels of crude-oil production has brought a cry for restriction from oil producers not engaged in such operations, as well as independent refiners who find their sources of supply as well as their markets threatened by these operations.

So, again we see a situation where technical and conservation advancements of the industry are running foul of the industry's economics.

Effect of War . . .

So far authorities in Washington have not been able to give the oil industry an estimate of what quantities of products will be required by the armed forces during the training period or for storage against possible conflict. But the industry's own statistical staff may well forsee what increases will result from acceleration of all industry by the program of preparedness. Efforts on the part of the government to prevent price increases will mean that only moderate raises will be permitted for gasoline, which in turn means that the oil industry's participation in whatever prosperity accompanies the acceleration of business will be through multiplication of its current small profit margin.

The situation in America, even should war actually come, is far at variance with what happened in Europe. To quote Sir John Cadman in his report to stockholders of Anglo-Iranian Oil Company: With the advent of war "Deliberate steps were therefore taken . . . to reduce the consumption of petroleum products, particularly of motor spirit. Motor taxation was heavily increased and strict rationing was imposed in most countries. Meanwhile, the war remained virtually passive, so that there was no large military consumption to offset the decline which took place in civil use."

Drilling During December Near High Point for Year

DECEMBER proved to be the second most active month of 1940 in the oil fields, well completions in the United States having averaged 92.7 daily. That rate of completions was comparable with the exceptionally high rates of mid-1940 and late 1939 and closely approached the near-record rates of the summer-fall period of 1937.

Instrumental in causing the spurt of drilling in December were several factors, it was indicated. Prominent among them were: (1) the improvement of the industry's statistical position and the resultant strengthening of the markets for crude oil, (2) the outlook for increased demand for petroleum in 1941, due in part to the national defense drive, (3) the drilling of wells before the end of the year for tax, lease-holding, and other special purposes, and (4) the continuance of advantageous weather for field work.

Although the industry was troubled almost throughout 1940 with surplus gasoline that piled up last spring, it made a deliberate and partially successful effort to correct the gasoline inventory situation by holding down the refinery yields of that product and by stepping up the yields of heating oils, which were in rapidly growing demand. Consequently, toward the close of the year, appreciable improvement of the gasoline situation was evident, and although prices of that product remained depressed to extremely low levels, there were grounds for hope of eventual betterment, possibly in the spring.

In so far as the crude markets are controlled by gasoline prices, therefore, they have been bolstered in the past month or so, although not definitely strengthened.

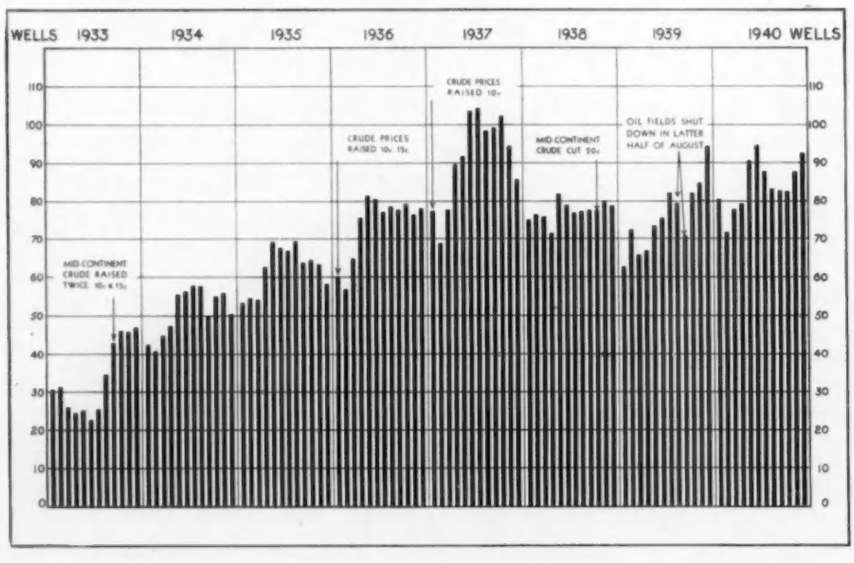
To the extent that the crude markets are affected by the markets for fuel oil, however, recent developments have been positively constructive. Light fuel oils are being used in the expected large quantities, with more oil burners employed than ever before, and refiners find ready demand for the supplies they can furnish. Prices of the light fuels, consequently, have been gradually advancing, exclusively of the increases made necessary by higher tanker rates. Crude oils desirable for their heating oil content are, therefore, in good demand, and producers apparently are taking this situation into consideration in their drilling activity.

Heavy Fuel Demand Increasing

Even more in the limelight lately have been the heavy fuel oils, as demand for those oils has increased sharply and is expected to continue exceptionally large, because of the high rates of industrial and commercial activity of the nation. Principal users of the industrial-grade fuel oils include the railroads, steamship lines, mines, smelters, manufacturing plants, and electric power plants; and all those users currently are extremely busy. Some difficulty may arise in meeting the requirements of heavy fuel oil, therefore; and although larger imports are anticipated, domestic producers of heavy crude oils henceforth will have ready markets for the output of their wells. Such producers naturally are inclined, under these conditions, toward pursuing active drilling policies. Inventories of the heavy fuel oils are more than 3,000,000 barrels lower than a year ago, in the face of the increased demand.

Producers of crude oils with high lube-stock content suffered in the greater part of 1940 from war-curtailment of exports, following the spurt in demand in late 1939 immediately after the outbreak of the war. But in the past several months there has been a pronounced strengthening of the lubricant markets, despite the fact prices so far have improved only a little. Whereas foreign demand has been restricted, domestic consumption now is being stimulated by accelerated industrial activity, and the larger industrial use importantly affects total demand. Better demand for lubricants has caused increases of refinery runs in the Appalachian region, and the larger refinery demand already has resulted in improvement of the prices of Pennsylvania-grade crudes. Those postings were lowered 90 cents a barrel in four reductions last summer, but they

Average Daily Well Completions in U. S., by Months



were raised back 15 cents November 12 and 15 cents December 17. Production of Pennsylvania-grade crude consequently has been stepped up, and the situation indicates that drilling will have to be increased in the Appalachian states to keep crude output abreast of refinery demand. The recent and prospective advances in crude prices will constitute incentive for the necessary drilling.

Gasoline Continues Weak

At least until the end of the winter, the gasoline market is likely to continue unstable, and the degree of unsteadiness will be determined to considerable extent by the weather. A repetition of the severe weather of last winter would be conducive to undesirably large production and storing of gasoline; but conversely, milder weather would aid in holding down the stocks of that product.

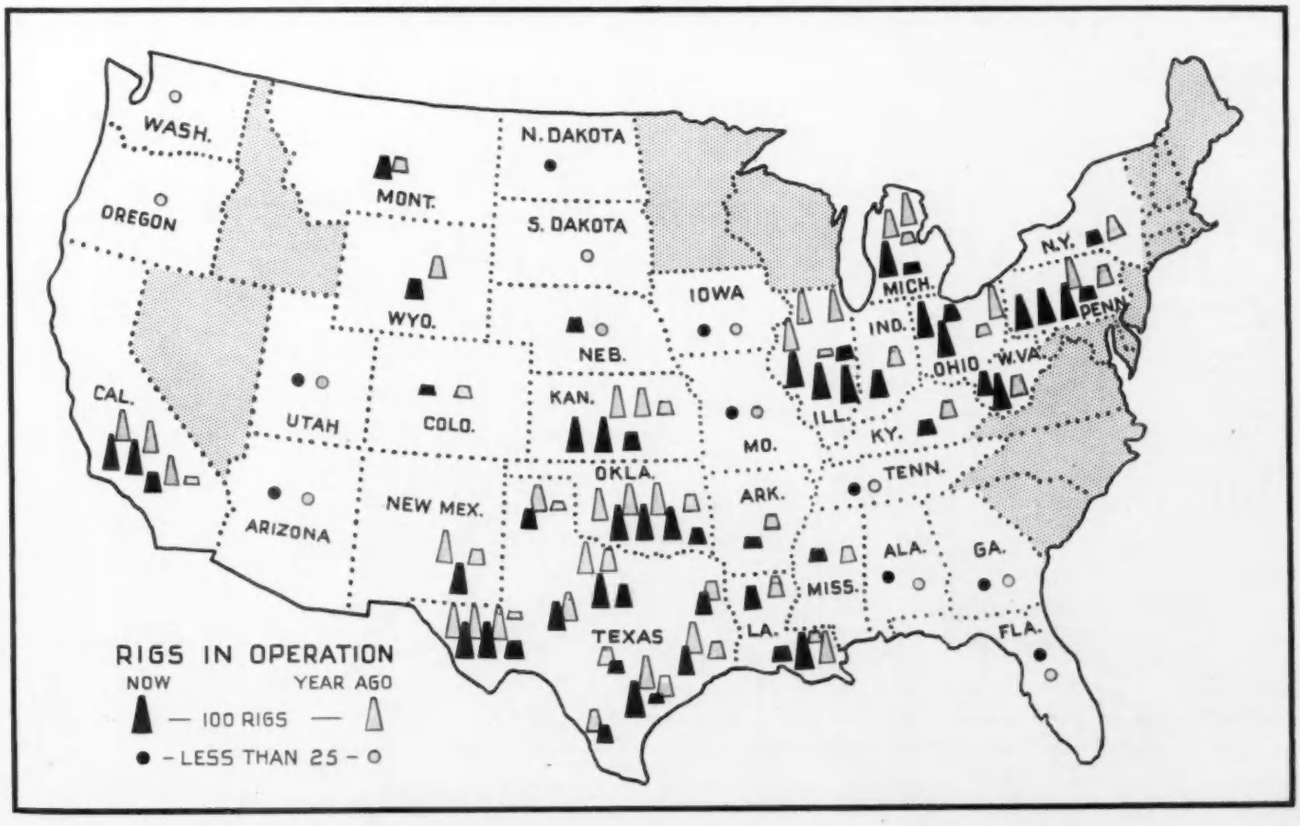
The heavy fuel oil situation also will exert an important influence on the gasoline market of 1941, whereas it was not a significant factor during the past year. A material expansion of consumption of the heavy fuel oils in connection with the defense program will require the running of more crude

Slightly More Rigs in Operation January 1 than Year Previously

STATE OR DISTRICT	TOTAL RIGS IN OPERATION Drilling, Rigs Up, Shut Down				DETAILS OF JANUARY 1, 1941 FIELD ACTIVITY					
					Rigs in Operation			Prelim. Activity		
	Year Ago (Jan. 1, 1940)	Month Ago (Dec. 1, 1940)	Now (Jan. 1, 1941)	Percent Change From Year Ago	Drilling	Rigs Up	Shut Downs	Derricks	Locations	Total Operations
Alabama	2	5	5	+ 150.0	2	...	3	...	...	5
Arizona	8	7	7	— 12.5	1	...	6	1	...	8
Arkansas	32	24	26	— 18.7	17	...	9	3	...	29
California	314	268	268	— 14.6	173	50	45	...	57	325
Colorado	34	27	30	— 11.8	17	...	13	...	...	30
Florida	3	4	3	...	1	...	2	...	...	3
Georgia	1	4	2	+ 100.0	...	...	2	...	...	2
Illinois	318	333	339	+ 6.6	247	35	57	6	39	384
Indiana	65	88	85	+ 30.8	41	5	39	...	12	97
Iowa	2	2	3	+ 50.0	...	1	2	...	...	3
Kansas	236	242	251	+ 6.3	200	29	22	12	9	272
Kentucky	67	54	51	— 23.9	32	3	16	...	5	56
Louisiana	205	227	218	+ 6.3	176	12	30	34	83	335
North Louisiana	70	106	79	+ 12.8	51	3	25	30	3	112
South Louisiana	135	121	139	+ 3.0	125	9	5	4	80	223
Michigan	243	148	122	— 49.8	69	17	36	19	30	171
Mississippi	36	31	26	— 27.8	18	2	6	5	2	33
Missouri	22	16	16	— 27.3	1	...	15	...	...	16
Montana	40	72	68	+ 70.0	22	2	44	...	1	69
Nebraska	2	35	37	+1750.0	21	3	13	1	1	39
New Mexico	150	102	95	— 36.7	62	3	30	1	10	106
New York	62	48	35	— 43.5	25	4	6	2	6	43
North Dakota	...	...	1	...	1	...	...	...	...	1
Ohio	121	252	256	+ 111.6	168	48	40	16	39	311
Oklahoma	346	340	348	+ 0.6	249	48	51	25	15	388
Oregon	1	1	...	...	...	...	...	...	...	...
Pennsylvania	165	378	321	+ 94.5	237	29	55	22	54	397
South Dakota	2	1	...	...	...	...	...	...	...	...
Tennessee	8	11	11	+ 37.5	6	1	4	...	1	12
Texas	1,268	1,010	1,003	— 26.4	765	75	163	70	338	1,411
East Texas Field	14	20	26	+ 85.7	22	2	2	15	10	51
East Texas Border Co.'s	10	12	11	+ 10.0	5	1	5	2	...	13
Rest of East Texas	43	42	40	— 7.5	26	4	10	9	6	55
North Texas	194	194	193	— 0.5	134	12	47	11	82	286
South Texas	309	222	227	— 26.5	171	24	32	20	119	366
Corpus Christi Area	166	120	121	— 37.2	92	17	12	10	70	201
Laredo Area	78	59	62	— 20.5	50	3	9	8	30	100
San Antonio Area	65	43	44	— 32.3	29	4	11	2	19	65
Texas Gulf Coast	159	102	96	— 39.6	86	9	1	1	18	115
Texas Panhandle	120	78	68	— 43.3	49	11	8	1	11	80
West Texas	311	243	245	— 21.2	209	8	28	11	74	330
West Central Texas	108	97	97	— 10.2	63	4	30	...	18	115
Utah	8	8	3	— 62.5	1	...	2	...	...	3
Washington	1	...	...	...	...	...	...	...	...	...
West Virginia	88	217	196	+ 122.7	145	16	35	14	33	243
Wyoming	74	75	68	— 8.1	33	5	30	...	8	76
Total United States	3,924	4,030	3,894	— 0.8	2,730	388	776	231	743	4,868

Drilling Rigs in Operation Now as Compared with Year Ago, by Districts

This map-chart is based on detailed figures shown in an accompanying table.



to stills than needed for turning out sufficient quantities of other products, it is indicated, unless the residual fuel yields are increased and gasoline yields reduced or unless imports of the heavy oils are enlarged materially.

The weakness of the light crude market has been evidenced in recent weeks by the reductions in posted prices of high-gravity crudes in the Corpus Christi district of South Texas. Those oils were cut by several purchasers from 2 to 24 cents a barrel, by elimination of the gravity scale in the higher brackets and placing of all oils above 28 gravity on the same price basis as 28-28.9-gravity crude. In the latter part of 1940 high-gravity crudes were reduced in price in Arkansas, North Louisiana, and South Louisiana; and the recent adjustments in South Texas reflect an extension of the market weakness for light oils into that district.

Drilling was carried out in December on about the same scale as in May and June and also at about the same rate as in December of the previous year. Well completions in the United States totaled 2595 in the four weeks ended December 28, an average of 92.7 daily. In the preceding four weeks (November), there were 2449 completions, or 87.5 daily. In December, 1939, there were 2660 completions within four weeks, or 95 daily, as field work spurted under the psychology of the new European war.

Daily average completions in December in recent years have been as indicated herewith.

December of	Wells Completed Daily
1933	47.0
1934	50.2
1935	58.0
1936	78.0
1937	85.3
1938	77.3
1939	95.0
1940	92.7

There were about 140 more completions in the United States in December, 1940, than in November, 1940, despite the fact that some districts showed decreases. Prominent among the gains were those from 162 to 180 in Kansas, from 183 to 212 in Oklahoma, and from 103 to 172 in West Texas, all of which reflected stronger markets for crude. Kansas and Oklahoma are regaining crude markets lost to Illinois as that state continues on the decline in production. And West Texas crude currently is in better demand than previously because of desirability in making aviation gasoline.

Rigs in Operation

Fewer completions are indicated for January than for December, as this publication's regular monthly survey of rigs in operation showed 3894 active tests under way January 1, compared with 4030 on December 1, a decrease of 136.

Preliminary figures, subject to revision in the Yearbook-Forecast number of January 27, 1941, indicate that 30,656 wells were completed in the United States in 1940. That was 11.4 percent more than the 27,508 recorded for 1939.

Completions in recent years have been as herewith shown.

Year	Total Wells Completed
1933	12,170
1934	18,949
1935	22,669
1936	26,935
1937	33,112
1938	27,528
1939	27,508
1940	30,656

Drilling Speeded in December, and Completions for 1940 Show Increase of 11.4 Percent

STATE OR DISTRICT	MONTHLY COMPLETIONS: Total			MONTHLY COMPLETIONS: Details for December, 1940[1]				CUMULATIVE COMPLETIONS: For Year 1940: Total			CUMULATIVE COMPLETIONS: Details for Year of 1940			
	Year Ago (Dec., 1939)[2]	Month Ago (Nov-1940)[3]	Latest Data (Dec., 1940)[1]	Oil	Gas	Dry	Initial Oil Production	1939	1940	Percent Change	Oil	Gas	Dry	Initial Oil Production
Alabama	....	1	1	....	....	1	.....	2	10	+ 400.0	.....	.....	10	.....
Arizona	....	....	....	....	....	....	.....	1	....	.....	.....	.....	....	.....
Arkansas	13	9	13	9	....	4	2,101	226	179	— 20.8	122	8	49	33,982
California[4]	122	70	87	81	2	4	54,666	1,116	1,051	— 5.8	877	16	158	769,609
Colorado	....	1	2	1	1	....	436	18	10	— 44.4	5	1	4	1,039
Florida	....	....	....	....	....	....	.....	.....	1	.....	.....	.....	1	.....
Georgia	....	....	....	....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois	395	291	318	228	1	89	42,792	3,845	3,947	+ 2.7	3,184	26	737	1,922,997
Indiana	41	71	58	21	13	24	2,955	298	532	+ 78.5	249	70	213	33,765
Iowa	....	1	....	....	....	....	.....	.....	1	.....	.....	.....	1	.....
Kansas	149	162	180	128	8	44	162,780	1,462	2,007	+ 37.3	1,538	60	409	2,345,502
Kentucky	63	40	29	13	....	16	941	656	367	— 44.1	168	8	191	10,519
Louisiana	136	151	151	104	6	41	22,932	1,172	1,704	+ 45.4	1,220	99	385	290,216
North Louisiana	43	65	62	47	4	11	4,875	345	657	+ 90.4	452	82	123	50,488
South Louisiana	93	86	89	57	2	30	18,057	827	1,047	+ 26.6	768	17	262	239,728
Michigan	116	103	77	28	1	48	2,601	1,447	1,193	— 17.6	566	59	568	104,513
Mississippi	6	20	13	6	1	6	3,522	19	190	+ 900.0	99	1	90	55,141
Missouri	7	6	7	....	4	3	.....	82	87	+ 6.1	3	30	54	33
Montana	19	11	27	17	10	....	1,927	144	192	+ 33.3	140	26	26	15,368
Nebraska	....	18	14	5	....	9	2,370	2	53	+2550 0	23	.....	30	14,032
New Mexico	55	40	37	30	2	5	8,453	650	623	— 4.2	487	18	118	178,293
New York	[6]92	[6]62	[6]61	[6]61	....	....	134	[6]672	[6]957	+ 42.4	[6]939	9	9	3,368
Ohio	104	140	147	33	75	39	569	984	1,132	+ 15 0	429	412	291	4,733
Oklahoma	200	183	212	132	26	54	30,352	2,081	2,147	+ 3.2	1,225	182	740	304,356
Pennsylvania[5]	[6]241	[6]287	[6]255	[6]206	40	9	270	[6]2,457	[6]3,690	+ 50.2	[6]3,264	281	145	4,982
South Dakota	....	....	....	....	....	....	.....	.....	1	.....	.....	.....	1	.....
Tennessee	....	3	1	....	....	1	.....	4	12	+ 200.0	4	1	7	857
Texas	812	705	794	601	21	172	332,634	9,444	9,775	+ 3.5	7,107	291	2,377	4,045,107
East Texas Field	20	34	41	39	....	2	49,415	423	323	— 23.6	308	.....	15	580,960
Rest of East Texas	22	27	31	14	3	14	3,353	311	292	— 6.1	129	51	112	29,677
North Texas	163	194	173	121	2	50	44,106	1,725	2,154	+ 24 9	1,468	14	672	749,031
South Texas	219	171	203	140	8	55	58,661	2,709	2,559	— 5.5	1,624	77	858	636,051
Corpus Christi Area	102	84	102	78	3	21	45,707	1,325	1,263	— 4.7	914	35	314	496,158
Laredo Area	91	65	81	52	5	24	11,389	1,000	1,043	+ 4.3	613	39	391	129,432
San Antonio Area	26	22	20	10	....	10	1,565	384	253	— 34.1	97	3	153	10,461
Texas Gulf Coast	98	89	79	65	2	12	19,047	1,296	1,185	— 8.6	941	25	219	241,119
Texas Panhandle	56	40	49	44	3	2	9,329	451	627	+ 39.0	517	83	27	143,033
West Texas	174	103	172	156	....	16	145,776	2,035	1,937	— 4.8	1,786	12	139	1,600,399
West Central Texas	60	47	46	22	3	21	2,947	494	698	+ 4.1	334	29	335	64,837
Utah	....	....	....	....	....	....	.....	.....	3	.....	.....	2	1	.....
West Virginia	73	69	95	13	62	20	109	596	649	+ 8.9	120	419	110	905
Wyoming	16	5	16	11	1	4	6,659	130	143	+ 10.0	111	5	27	92,389
Total United States	2,660	2,449	2,595	1,728	274	593	679,203	27,508	30,656	+ 11.4	21,880	2,024	6,752	10,231,706

[1] Wells completed in 4 weeks, or 28 days, ended December 28, 1940 [2] Wells completed in the 4 weeks, or 28 days, ended December 30, 1939. [3] Wells completed in the 4 weeks, or 28 days, ended November 23, 1940. [4] California completions except for December, 1940, revised in accordance with the American Petroleum Institute. [5] Bradford, Pennsylvania, completions revised in accordance with the Producers Monthly. [6] Includes water-intake wells.

Stratigraphic Traps Source of Major Production Over Central Kansas Uplift

By JOSEPH A. KORNFELD, Geologist

Part 1

WHILE stratigraphic traps have formed a major role in and gas accumulations over the Central Kansas Uplift since as far back as 1930, direct search for these particular structures have been neglected until the past year. Thus, stratigraphic traps in the past in Western Kansas have been accidental occurrences rather than the object of specific exploration. The reasons for this type of exploration may be summarized as follows:

1. Higher recovery rates per well and per acre due to steep slopes permitting more advantageous position for edge water to flush out the oil content of the sands, permitting drainage from a greater regional area.
2. Generally higher range of gravities of crude oil.
3. Comparative absence of "barrel" spots, in stratigraphic structures.

A New Technique

The exploration technique in Western Kansas is rapidly shifting away from the conventional methods of drilling the wildcat well on the crest of a local structural anomaly without first considering the possibility of a stratigraphic trap in the area. This is well emphasized in the Gorham pool of Russell County were the basal Pennsylvanian conglomerate and the Cambrian sand were deposited on the flanks of a local pre-Cambrian truncated peak, overlapped by the Lansing-Kansas City lime series of Pennsylvanian age; here development fringes the structure in the search for the so-called Gorham sand and the Arbuckle dolomite. Wells drilled too high on structure pass from Lansing lime into the barren granite.

This technique was employed successfully during 1939 by Sinclair Prairie Oil Company in the discovery of the Prusa pool of northeastern Barton County. There the geologists sought Arbuckle dolomite oil on the flanks of local pre-Cambrian peaks. Too often, wells drilled on the crests of the structure (as indicated by surface or core-drill data) proven barren while later development shows these dry holes to lie in the center of local production where the missing strata were encountered in flanking wells. No structure should be condemned after the first test well is drilled, until it is determined whether all known producing sands of that region are present, or whether some are cut out by local or regional truncation. This calls for finer study of sample logs and re-examination of available cores and samples.

Methods of Search

Five methods are being employed in the modern search for stratigraphic traps as follows:

1. Search for geologic wedges, through studies of past work along the strike.
2. Search for offshore bars, through the use of isopach sand maps.
3. Search for terraces flanking uplifts, through regional structural studies.
4. Search for porosity changes, through checking samples, principally on terraces.
5. Search for flank, truncated zones, which are beveled from crest.
6. Use of "stratigraphic core" tests at the paleographic strand line of the objective oil formation, drilled at right angles to the edge line.

In the search for geologic wedges, isopach thickness maps of the objective formation and its distance from its paleographic strand line

TABLE 1
Classification of Stratigraphic Traps

	Recovery Tendency	Reservoir Drive	*Gravity Tendency	†Spacing Requirements
I. Wedge Reservoirs (on Central Kansas Uplift)				
A. Wedge Reservoirs due to Truncation and Overlap				
1. Regional Truncations	High	Water	High	Wide
Example: Hall-Arbuckle Pool				
2. Local Truncations	High	Water-Gas	High	Close
Example: Voshell Pool				
B. Wedge Reservoirs due to Progressive Overlap				
1. Regional Truncations	High	Water	High	Wide
Example:				
2. Local Truncations	High	Water	High	Close
Example: Fairport Pool				
C. Wedge Reservoirs Due to Paleographic Outliers				
1. Regional	Vy High	Water	Medium	Close
Example: "Hunton" Lime				
II. Unconformity Sands				
A. Clastic Deposits over Base-Levelled Uplift				
1. Regional: Over Uplift	Low	Water	Low	Close
Example: "Sooy" Conglomerate				
2. Regional: Flanking Uplift	High	Water	High	Wide
Example: Wherry Pool				
3. Local: Flanking Buried Topography	Vy. High	Water	Vy. High	Close
Example: Gorham Pool				
III. Reservoirs Due to Change in Porosity				
1. Lensing Out Updip: Local	Medium	Water	Medium	Medium
Example: Iuka				
2. Change from Dolomite to Lime	Medium	Water-Gas	Medium	Wide
IV. Reservoirs Due to Buried Topography				
1. Local: Buried Prominences	Medium	Water	High	Medium
Example: Silica				
2. Local: Detritus Flanking Prominences	Medium	Water	High	Close
Example: Trapp-Conglomerate				
Legend:				
* Gravity (Degrees Baume)	32–35	35–38	38–42	Above 42

† Spacing requirements are cited above as generalities since the proper spacing pattern is dependent on many other factors including the rate of withdrawal, character of producing formations, thickness of producing formation, stratigraphic variation in producing formation permeability, effective porosity of producing formation, and the rate of development. Different spacing patterns will apply for oil pools as against gas pools.

are important. By tracing the northeast trend of the old Welch (chat) pool northeastward and through the use of regional contour lines, Bradley Brothers of Wichita were successful in discovering the Barnholdt North pool of western McPherson County. The search for "offshore bars" is comparatively limited due to the small area which each bar may cover. In the search for terraces flanking the uplift, gently-sloping terraces can be found, where nearshore sand bodies will most likely be deposited. This is exemplified in the Wherry pool of Rice County, where there is no closure across a producing area extending nine miles in length and five miles in width. Porosity changes are important, since the large Hugoton field is due to change in porosity in the lower Permian limestones. The search for flank, truncated zones not present on the crest is well proven in the Lyons gas field where the Simpson sand bodies, truncated from the crest, produce oil on the flank. This is often true in sharply-flexed structures, producing gas over the crest from deeper reservoirs.

[1] Wyckoff, R. D. "Factors Affecting Reservoir Performance," American Petroleum Institute, Twenty-First Annual Meeting, Chicago, Ill., proceedings (November 13, 1940), page 1.

Engineering Factors

Wyckoff[1] has pointed out that the type of reservoir is a matter for first consideration from the standpoint of reservoir performance and production development. Therefore, the importance of studies of stratigraphic reservoirs is clearly evident.

In this connection, it is emphasized that stratigraphic traps present different characteristics than the customary dome or anticlinal structure insofar as the following factors are concerned in relationship to exploration, development, secondary recovery and in appraisals:

1. Shape of Reservoir:
   Ex: Peripheral structure in Gorham sand and Arbuckle dolomite in Russell and Barton counties, Kansas.
2. Vertical amount of productive closure.
3. Variation in effective saturation of productive horizon.
4. Stratigraphic variation in lithology of productive horizon.
   Ex: From sandy dolomite to dolomitic sand (Iuka-Simpson pool of Pratt County, Kansas).
5. Stratigraphic variation in permeability of productive horizon; both vertical and horizontal.
6. Effective porosity of the produc-

tive horizon; and its distribution both horizontal and vertical.

7. Position of oil-water contact; its regularity, both horizontal and vertical.

8. Position of gas-oil contact; its regularity, both horizontal and vertical.

9. Angular contact of unconformity or detrital producing horizon, with underlying truncated anticline or dome, or monocline, permitting migration of oil, gas and water.

Commercial Importance

Stratigraphic traps are significant in that more than 110 local accumulations have been due to stratigraphic structure in 17 counties on and flanking the Central Kansas Uplift.

The largest stratigraphic trap in ultimate recovery and size of productive area developed to date in Kansas is the Wherry pool of southeastern Rice County. It is producing from the basal Pennsylvanian conglomerate. The ultimate recovery from this pool is estimated in excess of 36,622,000 barrels from more than 7200 producing acres. To May 1, 1940, this field had yielded 5,846,743 barrels. It has an average pay thickness of 22 feet, and an average pay depth of 3554 feet.

Leader in past production from stratigraphic traps is the Hollow-Nikkel pool of southern McPherson and northern Harvey counties. Although the accumulation in the Hollow sector is due partly to its position overlying a sharply-flexed, faulted structure, the accumulation is influenced by the wedging out of the Hunton limestone. The Nikkel area thus represents the wedge edge of the Hunton at right angles to and adjacent to the south-flanking Voshell anticline. To May 1, 1940, this field had produced 18,030,000 barrels. Together with an estimated remaining reserve

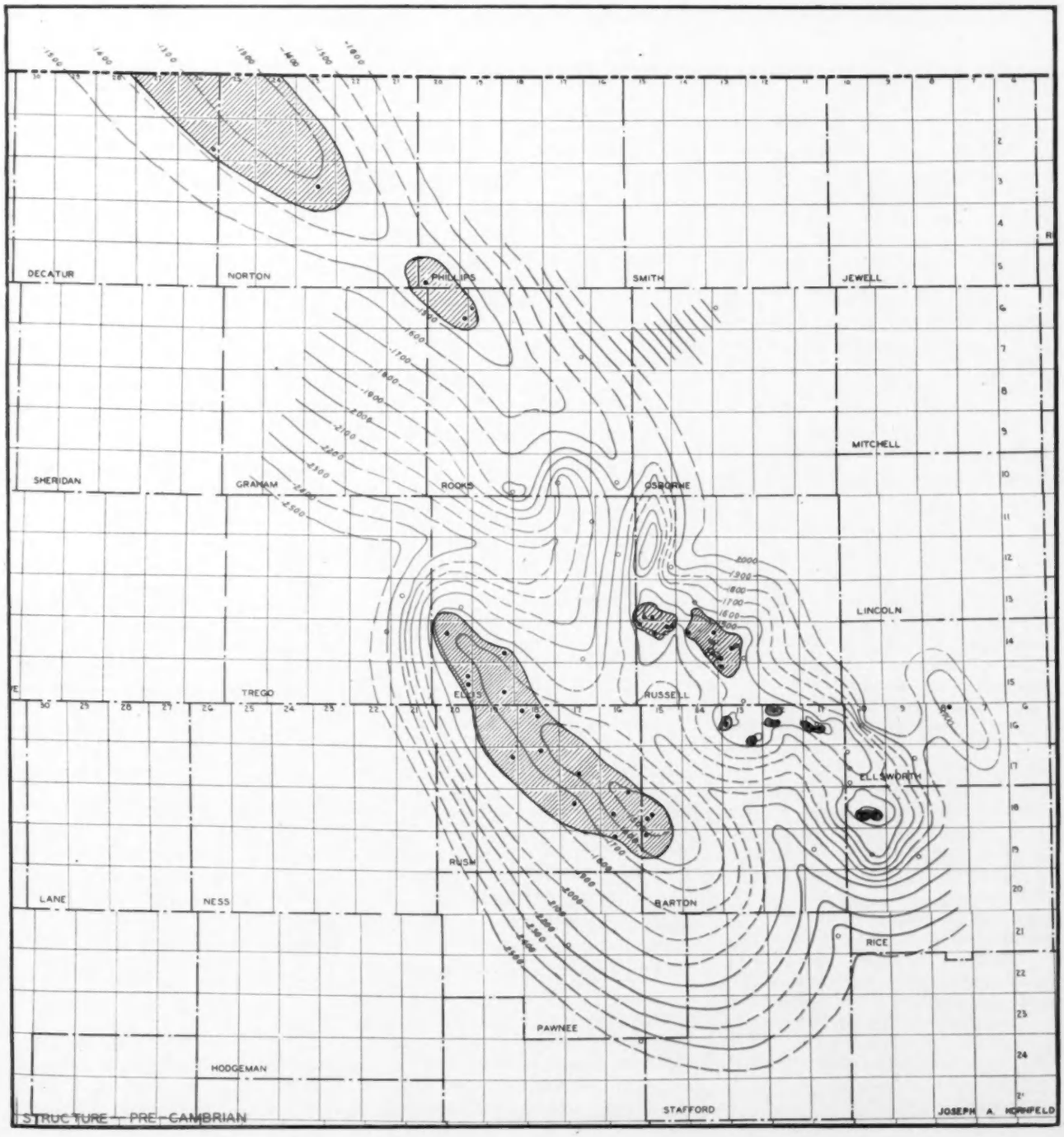


TABLE 2

Cambro-Ordovican Strata—Ozark Uplift Section

(Ulrich's Classification)

SYSTEM	FORMATION	CHARACTERISTICS (From Silicious Residues)
ORDOVICIAN	Kimmswick Decorah Plattin St. Peter Everton	
CANADIAN	Smithville Powell Cotter Jefferson City Roubidoux	Brown, silicious oolite basal zone of brown chert
OZARKIAN	Gasconade Van Buren Gunter Proctor Eminence Potosi	Loose-rounded sandstone, water-bearing Doloclastic chert; middle zone of silicious oolites
UPPER CAMBRIAN	Derby-Doerun Davis Bonneterre Lamotte	Sponge Spicules Basal zone-fine-rounded frosted sand Doloclasts in apple-green shale

Reference: Buehler, H. A., and McQueen, H. S. "Magnetometer Results and Silicious Residues in Missouri", Tulsa Geol. Soc. Digest, (1932).

of 6,041,000 barrels, the ultimate recovery will be 24,071,000 barrels.

A major area both in ultimate recovery and high recovery per well and per acre is the combined Barnholdt and Welch chat pools of southeastern Rice and southwest McPherson counties. The combined areas had produced 4,292,000 barrels of oil to May 1, 1940, along a marked wedge belt of Mississippian chat lying on the southeastern flank of the uplift. The remaining reserve of 20,047,000 barrels combined with the past production represents an ultimate recovery estimate of 24,339,000 barrels.

Production History

The earliest stratigraphic trap in Kansas to prove of outstanding commercial importance was the Wherry pool (originally called Hauschild) in southeastern Rice County. Although the core drill was the means of discovery of the pool, drilling showed only a gentle terrace on the top of the basal Pennsylvanian conglomerate at an average depth of 3400 feet. The accumulation reflected a productive closure of 90 feet, ranging from a subsea datum of 1690 feet on the northwest edge of the slope, to a subsea datum of 1780 feet on the southeast.

The next stratigraphic trap in commercial importance found was the Welch pool in southeastern Rice County, also situated on the southeast flank of the Central Kansas uplift. Situated only three miles east of the Wherry pool, the Welch area was discovered during April, 1924, from an average depth of 3370 feet in the Mississippian chat. More than 1500 acres have been proven productive to date. To January 1, 1940, the entire field had yielded 4,087,000 barrels of oil. At present, the field is free from proration restrictions; on the productive report 28 wells are listed. This pool has been one of the most profitable in Kansas, with a reported yield of 12,319 barrels per acre. The per-well output has exceeded 123,189 barrels.

The first commercial oil to be developed from the Hunton lime in Kansas came from the Hollow-Nikkel pool of Harvey and McPherson counties. Frank H. Hollow, Wichita operator, brought in Church 1 on the Hollow structure on December 17, 1931, swabbing 43-gravity oil. Accumulation in the Hunton lime is due to a combination of anticlinal structure and stratigraphic trap. There is a wedge-out of this formation to the north in southern McPherson County against the south-pitching slope of a regional fold.

To the north, Hunton lime production was found at the wedge-out of the Hunton against the south side of the Voshell anticline. Likewise stratigraphic accumulations were found in the Hunton lime on the north side of the Graber structure in southeastern McPherson County.

First commercial production from the Misener sand in Kansas was encountered in 1929 in the Voshell pool. Unconformity sands ranging up to 37 feet in thickness were found in Section 9-21s-3w. Initial flows ranged as high as 40 barrels of oil hourly. Here the Misener sand overlay the Viola lime. In this same field, local truncation of the Mississippian lime from the crest of the structure, has confined production from the chat to the east flank of the flexure.

Phenomenal discovery of Misener sand production at Zenith in September of 1937, came as a complete surprise. Drilled on a reflection seismograph anomaly, operators were seeking production in the Lansing-Kansas City series of the Arbuckle dolomite. These objectives did not produce in this field, but at 3807 feet the well flowed 40-gravity oil at the rate of 60 barrels hourly. At the time of its discovery, the nearest Misener-sand oil was in the Valley Center and Eastborough pools 68 miles east.

Geologic History of Central Kansas Uplift

To properly understand the sedimentation, structure and occurrence of stratigraphic traps on and flanking the Central Kansas uplift, it is essential to introduce here a review of the basic conceptions of regional and local conditions throughout the pre-Paleozoic and the Paleozoic systems. The last transgressive sedimentation occurred during lower-Pennsylvanian time, and although renewed uplift took place in Pennsylvanian time, the uplift is obliterated by the Permian and Cretaceous rocks.

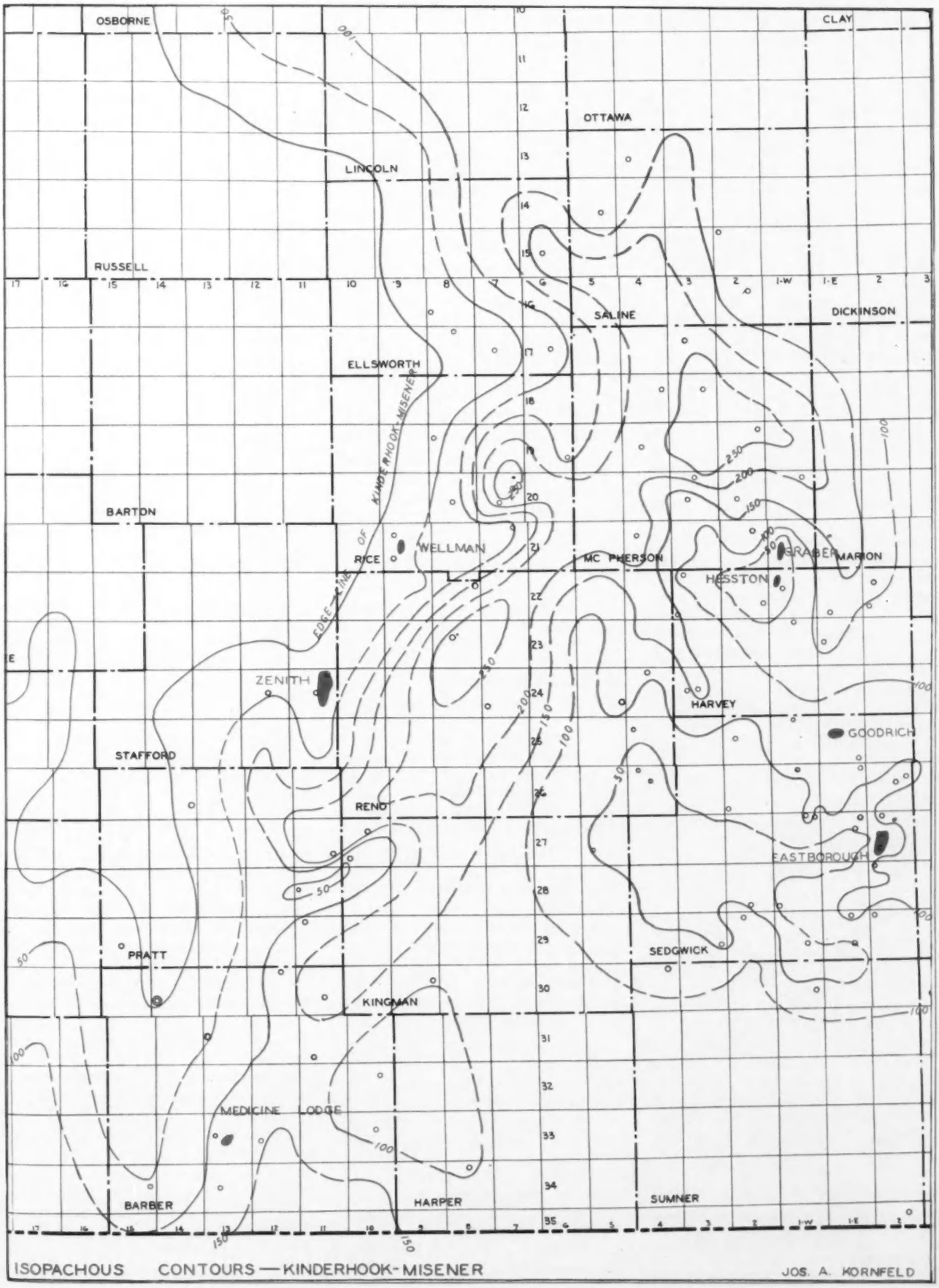
Pre-Paleozoics

Koester[2] states that the earliest movements in the history of the Central Kansas uplift were comprised in a series of parallel batholiths which were intruded into younger schist and quartzite in pre-Cambrian time. Proof of subsequent regional truncation uncovering the granite core is obtained through cuttings and cores of wells that drilled into the core, and the deposition of arkose and red clastics in depressions flanking the uplift. As much as 1020 feet of red to brown, fine to coarse arkose with feldspar was deposited in a deep test drilled on the east flank of the Central Kansas Uplift (Osage Oil Company's Kunkle 1, SE NW SW 3-16s-8w, in Ellsworth County).

Paleozoics

Lower Cambrian. The nucleus of the uplift remained land during Lower-Cambrian time as did other regional positive elements in the

[2] Koester, Edward C., "Geology of Central Kansas Uplift," Bull. Amer. Assoc. Petrol. Geol. Vol. 19, No. 10 (October, 1935), p. 1425.


OSBORNE
CLAY
OTTAWA
LINCOLN
RUSSELL
SALINE
DICKINSON
ELLSWORTH
BARTON
RICE
WELLMAN
MC PHERSON
GRABER
MARION
HESSTON
EDGE LINE OF KINDERHOOK-MISENER
ZENITH
HARVEY
GOODRICH
STAFFORD
RENO
EASTBOROUGH
PRATT
SEDGWICK
KINGMAN
MEDICINE LODGE
BARBER
HARPER
SUMNER
ISOPACHOUS CONTOURS — KINDERHOOK-MISENER
JOS. A. KORNFELD

western interior province including the Arbuckle Mountains and the Ozark uplift. Frequent, renewed uplift and erosion continued to develop a complex configuration of the basement rocks over the old land surface.

Cambro-Ordovician. During Upper-Cambrian, Ozarkian and Lower-Canadian time, a series of basal sandstones were deposited as a transgressive overlap over the entire uplift. Correlation of this deposit with the Reagan of the Arbuckle Mountain section or the Lamotte of the basal Upper Cambrian of the Missouri section are generalized misconceptions.

Gradual lowering of the region, or a slow advance of the sea, introduced a transition zone of sandy dolomites and with deep water conditions that persisted through Beekmantown time, great thicknesses of dolomitic limestones were laid down. These were laid down tarnsgressively so that Cotter and Jefferson City beds were laid down over the highest prominences of the uplift, while Ozarkian beds flanked the uplift.

Van Buren dolomite of Ozarkian age overlies pre-Cambrian rocks over the Nemaha granite ridge in Butler County, while both Canadian and underlying Ozarkian beds have been found over pre-Cambrian quartzite in a deep test drilled in Barber County.[3]

Ozarkian Unconformities. Two important unconformities have been recognized in the Ozark section of Missouri as follows, and are cited herewith for their relationship to the Arbuckle section flanking the Central Kansas uplift:

(1) Basal Ozarkian unconformity occupying the hiatus between the Potosi and the underlying unconformable Davis beds, both in the Potsdam group.

(2) Middle Ozarkian unconformity, in the hiatus of pre-Gunter and post-Eminence, the Proctor being absent; this corresponds with the regional erosional unconformity between the Potsdam and the overlying Prairie Du Chien groups of the Iowa and Illinois sections.

Major unconformities within the Arbuckle dolomite have been recognized by McQueen in a Chautauqua County well, the basal Ozarkian unconformity being represented by the absence of Eminence overlying Bonneterre, the Potosi, Derby-Doe Run and Davis beds being absent; the Middle Ozarkian unconformity is the customary absence of Proctor between Gunter and the underlying disconformable Eminence. Another important unconformity lies within the Canadian itself, the Jefferson City dolomite being absent, while the Cotter beds overlie disconformably the Roubidoux.[4]

Arbuckle dolomite normally overlies the transgressive Cambrian sand. Locally, however, in the Breford pool, Upper Canadian Arbuckle dolomite overlies unconformably the pre-Cambrian quartzite (Transwestern Oil Company's John R. Meyers 1, SW NW NW 18-17s-10w. West of the Central Kansas uplift, but in Logan County, the Arbuckle dolomite is in direct contact with weathered pink granite and mica schist (Morgan-Flynn & Cobb et al's McMillan 1, C NW 9-13s-37w). Top of Arbuckle dolomite is determined by first appearance of blue, chalcedonic cherts carrying oolites.

Although many accumulations of oil in the Arbuckle dolomite overlie the crests of peak created by pre-Cambrian movements, the majority of the pools in this formation occur at the highest structural contours of eroded paleo-topography. The Ordovician conglomerate of Chazyan age, deposited as a detrital zone over the uplift, filled the topographic valleys and sinkholes. It is no uncommon occurrence to find these sinkholes in the old Arbuckle land surface eroding deeply into the old Arbuckle land surface as much as 163 feet below the average subsea level of the offsetting group of wells; this creates spasmodic dry-holes in the midst of production ever near the crest of the structure. As many as 36 sinkholes were found in the Silica field alone.

Beds of Cotter oolitic chert are overlain by from 40 to 50 feet of "Viola" limestone at a test drilled in western Gove County (Cities Service Oil Company's Victory 1, C WL NW 36-13s-30w).

Ordovician Conglomerate. With a general emergence of the Central Kansas Uplift at the close of Canadian (Beekmantown) time, following the deposition of massive Arbuckle dolomitic limestones, there came a hiatus which occupied nearly all of Chazyan time. The old Arbuckle land surface was eroded considerably and regional truncation on a great scale took place, principally denuding the Cotter and Jefferson City members. Sinkholes pock marked the rugged surface of the Arbuckle formation and this Ordovician conglomerate tended to obliterate the relief on that formation—filling the slopes and valleys between the topographic peaks.

Simpson Formation. Following the Chazyan hiatus, the Simpson formation was laid down, forming a U-shape belt around the periphery of the Central Kansas uplift, with the open side to the northwest. Two inliers occupy high contours of the uplift in Graham and Rooks counties. The formation represents the Spechts Ferry equivalent of the Lowville stage of Black River time in the Mohawkian group. It comprises mainly olive-green shale with a series of sand lenses and minor amounts of dolomitic sands. In age, they correlate with the upper member of the Platteville limestone.[5] In this area, the Simpson formation is in disconformable contact with the underlying Arbuckle dolomite; it is overlain in most cases by Decorah shale and by the Viola limestones on the flanks of the uplift; while on the periphery of the Central Kansas uplift, it is in disconformable contact with the basal Pennsylvanian conglomerate. Considerable horizontal variation in the Simpson accounts for frequent stratigraphic accumulation of both oil and gas.

Decorah Shale. Decorah shale of Rockland stage of Trenton time overlay the Simpson formation, principally in the Salina and Forest City basins.

Viola Limestones. Limestone layers ranging in age from basal Trenton to uppermost Cincinnatian (Eden and Maysville) comprise the so-called Viola limestones on and flanking the Central Kansas uplift. The name Viola was borrowed from the Arbuckle Mountain section of Oklahoma like many of the other lower Paleozoic nomenclatures, whereas they are related closer to the Ozark Mountain and Iowa nomenclatures. In the Forest City basin, the Viola lime of Trenton (?) age displays affinities to the Iowa section—the lower chert wedging out, the middle chert carrying across, suggesting progressive overlap of the lower zone. The upper fossiliferous zone carries spicules and silicified brachiopods in a shaly matrix.

In the Salina basin, the Viola limestones are principally Galena of upper Trenton age, including the Prosser, Stewartsville and Dubuque correlatives of the Iowa section. Here, no Fernvale or Rich-

[3] Koester, Edward C., Op. Cit. page 1, 417.
[4] Ibid.
[5] Kay, G. Marshall, "Ordovician System in the Upper Mississippi Valley, Kansas Geol. Soc. Guidebook Ninth Annual Field Conference (1935), pp. 281-295.

mond beds are encountered. The sediments are principally granular limestone, only partially dolomitized in the Galena beds. The Galena is overlain disconformably by the Hunton lime in a well drilled in southeastern Jefferson County, Nebraska (L. R. Page, Tulsa, Bonham 1, C SE SE 31-1n-1e). Apparently there is no break in sedimentation, the cuttings in the well drilled in the basin suggesting almost continuous deposition.

In Marion and Butler counties, the Viola limestones carry Richmond fossils in coarsely-crystalline lime in a test drilled by Cities Service Oil Company (Houston 16, Section 19-26s-5e), on the Kugler fault, suggesting Fernvale. Redmon believes that there may be stratigraphic traps in the Viola in this area from "lateral traps which may be caused by buried bevelled pre-Devonian scarps of Viola." The Viola lime produces on anticlinal structure at Peabody, Covert-Sellers and Florence pools in Marion County; also in the Augusta and Eldorado fields of Butler County overlying the Nemaha granite ridge. It is overlain by the Devonian unconformable overlap. In this area, the Viola is all coarsely-crystalline limestones with occurrence in the lower third of the section of pale green, pyritic shales with few, thin laminations.

In Sedgwick County, the Viola is white, dense, gray lime or coarse crystalline dolomite. Fernvale fossils have been reported from the Burrton field by Dr. C. W. Honess.[6] Likewise, Fernvale age is ascribed for the upper coarse crystalline dolomite in Ellsworth County. The occurrence of *Rhynchotrema capax* has been reported in a core cut in the Zenith field (Standard Oil & Gas Company's R. Sims 6, NE 11-24s-11w), the age of which is regarded as Cincinnatian, possibly Maysville. The same species has been reported in the Viola in the Hollow field of Harvey County.

The Viola lime is underlain by Arbuckle (?) at Stanolind Oil & Gas Company's Judd 1, C SE SE 15-21s-38w, in northwest Kearny County. In Finney County, it is underlain by Simpson at Champlin Refining Company's Ely 1, Section 34-22s-29w; likewise in Gray County at Indian Territory Illuminating Oil Company's Dirks 1, Section 34-28s-29w. On Osage Island in Osage County, Oklahoma, Viola limestones are overlain by Mississippian rocks.

Fernvale age for the upper portion of the Viola lime is ascribed by Johnston[7] in the Hollow pool of Harvey County, while the lower unfossiliferous zone suggests correlation with the Trenton Kimmswick of the Missouri section. The lower zone is lithologically dissimilar to the upper portion, and is underlain by Decorah fossils.

Sooy Conglomerate. Edson[8] describes the Sooy conglomerate as an orogenic molasse deposit representing the two sub-phases of Wichita orogeny as well as several Lower and Middle Pennsylvanian orogenic periods. Although it is of Lower Pennsylvanian age, it has no definite stratigraphic position, resting on beds ranging from pre-Cambrian to Upper Bendian, and is overlain by beds ranging from Morrow to upper Lansing. Everywhere, the Sooy is overlain by some part of marine sediments. Its depositional area is widespread, covering nearly all of the Central Kansas uplift. The Gorham sand is a phase of it, and includes reworked Cambrian quartzitic sandstones. It is a heterogeneous mixture of reworked materials varying from one locality to the next with reference to lithology.

Maquoketa Shale. The Maquoketa formation lies disconformably upon the Galena dolomite. The formation is named from the type locality of the Little Masquoketa River of Iowa. This is correlated with the Cincinnati shale of Wisconsin, the Sylvan shale of Oklahoma, and the Cason shale of north central and northwest Arkansas. Its Richmond (Medinan) classification in the lowermost Silurian is proven by paleontologic evidence from a markedly fossiliferous horizon at the base of the formation. Another fossiliferous horizon occurs at the top on the outcrop.[9]

Johnston[10] has differentiated the Maquoketa shale in the Hollow pool of Harvey County as follows,

Zone	Classification[11]	Lithology
Zone 1	Brainerd	Calcareous shales intercalated with dolomitic limestone, with included phosphatic fossils. These dolomitic limestones vary greatly in thickness and where thickest much chert is usually present.
Zone 2	Fort Atkinson	Dark gray to olive green splintery dolomitic shale containing graptolites.
Zone 3	Clermont	Thin green shales and drab to brown argillaceous cherty finely-crystalline dolomites which may contain spicules and small graptolites.
Zone 4	Elgin	Light to olive green splintery pyritic shales, containing graptolites; very thin layer.

paralleling the Iowa section of Ulrich:

The Maquoketa is found to be as much as 200 feet thick in a minor basin lying on the southeast flank of the Central Kansas uplift, with greatest thicknesses observed in western Reno, Rice and McPherson counties. Everywhere, it is underlain by the Viola limestone, usually Fernvale member. Usually, it is overlain disconformably by the Kinderhook shale of Lower Mississippian shale, but in parts of Harvey, Reno and McPherson counties the Hunton lime is found directly above the Maquoketa. No commercial quantities of oil have yet been encountered in the Maquoketa formation in Kansas or Iowa.

Pennsylvanian Uplifts. Renewed uplift of the Central Kansas uplift came during post-Wapanucka pre-Atoka during the widespread Wichita orogeny. Simultaneously, the Nemaha granite ridge was faulted and raised, while similar movement took place along secondary folds lying between the Nemahas and the Central Kansas uplift.

Another period of renewed structural growth that affected the Central Kansas uplift came during post-Lansing and pre-Douglas time. This was a gentle folding and warping movement.[12]

Minor structural movements, in part compensatory, took place during the remainder of Pennsylvanian time.

The last period of structural growth is post-Cretaceous, which revived earlier folding along the Lerado anticline, and parallel adjacent structural flexures.[13]

The second and concluding installment of this series, to be published in an early issue, will discuss the production characteristics, geology, lithology and crude oil analysis data of each formation productive from stratigraphic traps on the Central Kansas Uplift.

[6] Oral Communication.
[7] Johnston, Leslie A. "Pre-Pennsylvanian Stratigraphy of the Hollow Pool and Adjacent Areas of the Central Kansas Basin," Tulsa Geological Society Digest (1934), p. 12.
[8] Edson, Fanny Carter, "The 'Sooy' Conglomerate of Kansas," Tulsa Geological Society Digest (1934), p. 30-32.
[9] Willis Bailey, "Index to Stratigraphy of North America, pp. 180 to 183.
[10] Johnston, Leslie A. "Pre-Pennsylvanian Stratigraphy of the Hollow Pool and Adjacent Areas of the Central Kansas Basin." Tulsa Geol. Soc. Digest (1934), page 13.
[11] Standard classification by E. O. Ulrich.
[12] Rutledge, Richard B. and Howard S. Bryant, "Cunningham Field, Kingman and Pratt Counties, Kansas," Bull. Amer. Assoc. Petrol. Geol. Vol. 21, No. 4 (April, 1937), page 515.
[13] Ibid, page 517.

Separate Units Aid Wire Line Coring

WHERE continuous coring at greater depths is desirable, as in fields found along the Gulf Coast, wire-line coring finds wide application. Round trips with the drill stem are then required only when the coring bit must be replaced or direction of the hole corrected.

On operations with a depth of 10,000 feet or more, there is a marked trend toward the use of separate sand-line units, entirely removed from the drawworks and powered by separate electric motor, steam engine or internal combustion unit, depending upon, but not always identical with, the type of power used on drawworks and mud pumps.

Unless the rotary is of the two-unit type, with separate engine on the rotary drive, usual location of the sand-line reel is on the tool ramp side, in full view of the driller. When individual, above-floor rotary drive is used, lack of space at this point calls for location of the sand-line reel directly behind the drawworks drive, in some instances an extension of the floor carrying it on an overhang behind the regular floor structure.

Usual set-up of the sand reel calls for two men in attendance while it is being run. One man, facing the driller, operates the throttle and checks amount of line paid out or wound on the drum, while the second stands by the brake and also checks the line for proper run and correct spooling.

Wire lines used for sand-line coring on 10,000-foot tests are rarely chosen less than 9/16, with 5/8 the most commonly used size, more 7/8 being employed than the size below 5/8. Construction of the line varies with individual preference, the 6/7 improved plow steel or plow steel lines being used in some instances, especially on wells where the coring is intermittent, and required only at widely spaced intervals during the drilling program. The tendency in wire lines for this work is toward the 6/19 construction, either Seale or Warrington, with hemp center, most of these lines being preformed and specially treated to guard against the corrosion which attacks such lines during their periods of inactivity. Gain in breaking strength is attained by the use of the special 6/19 lines, the values being 13.8 tons for the 6/7, and 16.6 for the other, on 5/8 lines.

Proper Spooling

Ease of spooling without necessity for either line guide or vibration and whip-dampening device is a factor which often dictates the choice of line type for wire-line

Pipe and hand-wheel extensions to reverse lever and steam control valve enable one man, at the brake lever, to start, stop and reverse the reel without help.

coring, manual control of spooling to insure even winding requiring the services of a third man or pulling one from the brake and leaving this end of the unit unattended. Hand control, through the use of a bar, board or other improvised lever, also frequently results in displacement of the flag or marline used to mark end of line travel for a given depth, resulting in possible overrun of the line in the hole.

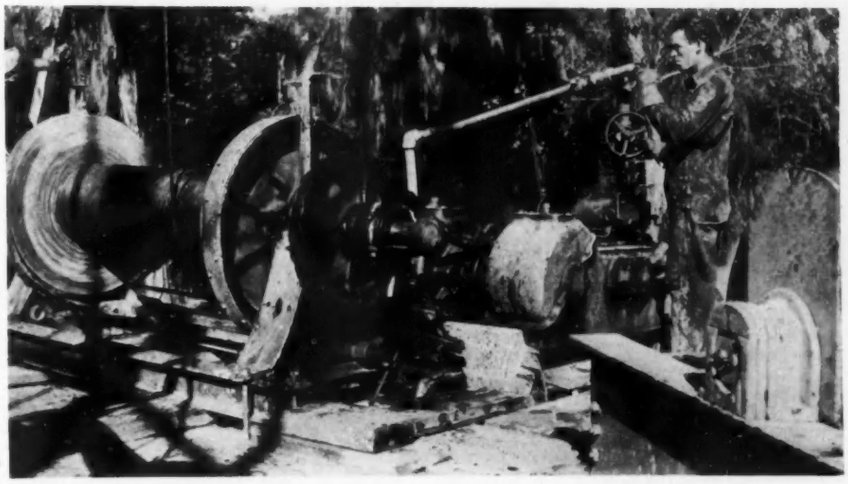
Spooling difficulties, assuming proper line is used, may be minimized by location of the sand-line block and the reel so that at no time does the fleet angle exceed 1½ degrees. The fleet angle is that angle between the center line of the sheave and that of the rope when winding is taking place at the extreme end of the drum. Since a fleet angle of 1½ degrees is the equivalent of approximately 40 feet of lead for each foot of traverse on either side of the drum, a sand-line unit with a 60-inch reel should be suitable for a correctly spaced sheave on a derrick in excess of 100 feet in height.

Fleet Angle

Neglect or disregard of the fleet angle in setting up sand reels, or subordinating the care of line to considerations of derrick floor space, frequently results in set-ups in which one end of the reel is so located as to give a fleet angle of zero value, while that at the other end of the reel is double the figure expected, were the angle evenly divided. Such a set-up, with excessive and widely varying fleet angle during spooling, results in the line tending to pile on the reel at one end, and to spiral away from the offset end at completion there of each layer of line on the drum.

Since the usual sand-line sheave is swivelled on its support at the crown block, slight relocation of the sand reel, to bring the center line of the drum perpendicular to the pin of the sheave, will tend to redistribute the fleet angle and solve the spooling problem. Winding of the line evenly on the drum without outside guidance is simplified also if the drum is balanced before the line is wound on it. A drum seriously out of balance imposes fluctuating impulses on the line which are magnified as whip and cause irregular running, uneven wear on both sheave and line, and may add as much as 50 percent to the theoretical load on the wires on the strands.

Enclosing of the sand reel with the exception of a narrow slot at the top for the line prevents the slinging of mud or (on old lines) bits of broken wire across the derrick floor, to render footing hazardous or cause possible injury. When such a housing is used, it should be in two or more parts, with adequate opening between to insure proper drainage and ventilation of the line between runs. Passage of a free current of air over and through a coiled line will quickly remove much of the moisture which, if left undisturbed, would cause corrosion or lessen the lubricating value of the materials soaked into the hemp core.



Properly centered reel on extension to derrick floor provides even spooling at maximum speeds on this separate, steam-powered sand-line coring reel.

Enclose for Safety

Enclosures on reels should not only cover the drum, but should also cover the spider or spokes of the ribbed disks forming the ends of the drum. This precaution is necessary to prevent possible injury to men on the floor who, to make a slight shift in the amount of line on the drum, are prone to attempt to kick the reel around, a practice which has led to many foot injuries on rigs using unprotected reels.

A brace between the twin brake support castings carries a row of guide pins behind which a board or bar may be braced while correcting unruly spooling tendency of line.

Reduction of the number of men required on sand-line-reel operation is being accomplished by a few drilling companies by combining brake and power controls at one point, the more common method being to bring throttle and reverse controls to the left end of the unit, so that the operator faces the reel, but stands with his back to the driller, dependent upon oral signals for guidance.

With properly located units, employing preformed lines and adequate sheave capacity, one man is able to handle the line both into the hole with the go-devil and out again with the core barrel, with greater ease than two men can collaborate on the operation if the control be divided.

Since sand lines rarely wear out when used for wire-line coring, more attention to proper ventilating of the line, together with an adequate and frequent doping of the line with the proper type and grade of lubricant, will work to postpone the corrosion which embrittles the individual wires, causing breaks and resulting in replacement long before the wearing surfaces of the outside wires have been reduced in area sufficiently to impair effective performance or lower safety factors under tension.

Get the Rig in Shape While Cement Is Setting

SHUT down periods for repairs has been decreased to a minimum on Carter Drilling Company rigs by O. B. Fultz, South Texas superintendent. This has been effected through a practice followed by the crews during the period after the production string of casing has been set and the well is awaiting the hardening of cement.

First, the rig and the entire location are given a thorough cleanup, removing all surplus debris from the general vicinity. This trash, together with the cement sacks are burned, thus placing the area in condition to enable the crew to engage in the second step of the program.

Everything on the rig and around it has its place and each piece is returned to it. All thread protectors are stacked out of the way on pieces of scrap lumber, and they are oiled when considered necessary.

All boiler hand-hole and man-hole plates are removed, the boilers are completely washed, then carefully inspected on the inside. The outside of the boilers is then cleaned and painted. The boiler feed units, water heater and light generators are cleaned, inspected and painted. This operation has a dual purpose. As well as protecting equipment and lessening deterioration, the boiler equipment is made much safer for the crew.

The mud pumps, rotary, swivel, crown and traveling blocks, engine, drawworks and all other parts of the rigs are cleaned, checked for any needed repairs, then painted. This clean-up reveals any possible flaws, breaks or wear in the machinery. With these repairs completed and the rig painted, the completion of the well is carried ahead.

As soon as the rig is skidded, or dismantled and rerigged at another location, it is in condition to immediately start making hole. This proves a time saver from several points of view and materially increases the efficiency of operation.

The Carter Drilling Company has gained an excellent reputation for the repair, cleanliness and general appearance of its equipment. Fultz points out that this practice has been largely responsible for the company being able to keep the best of men on its rigs. The work not only saves time and money and pays good dividends to the company, but it also has removed enough hazards so that the accidents to employes have been reduced by a great degree. This item has such a far reaching effect that the company cannot exactly calculate it in dollars and cents.

Inspection of drilling equipment of Carter Drilling Company is carried on to the fullest degree and repairs are made immediately as required. Above, three members of the crew are checking condition of the drawworks. Left, O. B. Fultz, district superintendent, oversees inspection of the rig.

The Shell
SOLUTIZER PROCESS
removes the mercaptans
instead of *merely oxidizing them to disulfides*

UNLIKE commonly used methods of doctor sweetening, the Solutizer Process eliminates the mercaptans from gasoline (to negative doctor test). Through the use of Solutizer (potassium isobutyrate) this new method recently announced by Shell

— increases LEAD SUSCEPTIBILITY
— improves INITIAL OCTANE NUMBER of many gasolines
— lowers SULFUR CONTENT
— improves INHIBITOR SUSCEPTIBILITY

Savings experienced in actual operation indicate a very short pay-out time for equipment. For information write Shell Development Co.

SHELL REGENERATIVE MERCAPTAN REMOVAL PROCESS

This method, used in conjunction with doctor treatment, removes lower boiling point mercaptans with caustic which is regenerated for continuous use. Licensed by Shell Development Company. (U. S. Pat. No. 1,943,744)

SHELL PHOSPHATE PROCESS

A process for eliminating hydrogen sulfide from butane, propane and other gaseous and liquid hydrocarbons. The method is regenerative. Operating and maintenance costs are low. Licensed by Shell Development Company.

SHELL

SHELL DEVELOPMENT COMPANY

100 BUSH STREET · SAN FRANCISCO · CALIFORNIA

Preventing Paraffin Formation By Air Control

Paraffin difficulties are aggravated by careless injection of air pressure

By F. R. COZZENS, Equity Oil & Gas Company

WHEN oil producers meet and the problem of paraffin discussed as it generally is, there are likely to be arguments as to the causes and extent of paraffin formation. Most operators now agree that air influences this troublesome condition since paraffin appears first at the casing head. It then collects inside and down the tubing to the bottom of the well, and spreads finally over the entire surface of the sand-face until the sealing-off process is completed. Many operators believe, however, that paraffin does not stop at the sand-face, but gradually works its way for indefinite distances back into the body of the sand. This theory is sometimes scoffed at, but at a meeting of stripper field oil producers held in my territory recently, an authentic case was cited where a piece of sand, blown out by nitroglycerine from a newly drilled well, revealed channels thoroughly clogged with paraffin, even though the location was more than 1000 feet distant from any wells previously drilled. This operator admitted, however, that he was redrilling a district which had once been air-pressured. A rather extensive survey was made, following this case, through a wide cross-section of stripper field territory, and where paraffin was reported to have been found in a sand body, we discovered in every instance, that the district had at some previous time, been aired.

Penetrates Formation

Since paraffin is a hydrocarbon, it is logical to assume that some atmospheric element, probably oxygen plays a very important part in its formation. When air under pressure is forced down a well and into an oil sand for an indefinite distance, sometimes exceeding three miles, the formative agents are carried along with it and paraffin may form in its wake through the entire course. But there are certain definite restrictions. Paraffin does not readily form in salt water, and almost never occurs in the presence of live oil. If the operator controls his air after the peak of oil production has passed so that channels in the sand are kept filled with fluid instead of air, the formation of paraffin through the sand body is eliminated entirely.

Abuses Cause Trouble

Air under pressure has been, and will continue to be a very successful means of oil recovery, but like all other good methods its use can be abused. Many districts, through ignorance, have been literally "aired to death." That is, pressure has been carried and even increased long after wells had ceased to produce oil at a profit. In numerous fields it is necessary to release large quantities of air from producing wells before oil production will start. In some fields, wells are allowed to remain open and "blow off" for weeks, while attention is being given to some other part of the district. Oil sands in all such fields are likely targets for paraffin, and the operator who redrills them is quite certain to face serious difficulties.

Formation of paraffin in the bottom of a well and upon the sand face, is now being relieved in a high percentage of cases by means of carbide, or by the use of one of the several paraffin solvents now being manufactured commercially for the purpose. But not until some method has been found to force such agents deep into the body of the sand will the problem be solved for the operator who discovers paraffin in the channels of the sand itself. Considering the recovery value of oil in the average district, costs would prohibit the forcing of solvents through a sand body under present conditions.

Can Be Eliminated

Operators, however, who have made no such paraffin discovery in their pay sands can practically eliminate its happening by careful methods of production. It has been proven that the forming of paraffin on the rods and tubing of a well can be retarded greatly by keeping the top closed as much as possible against surface atmosphere. Where any form of air recovery is used, the careful operator will lessen the pressure at the intake wells when the peak of oil production has been passed. Introducing air at several points on a project usually procures a better production and reduces the risk of cutting air channels through the sand. Abandoned wells should never be left open. Wells being flowed by air should be returned to regular pumping and pressure reduced as soon as air pockets begin to appear above the fluid. The wise operator never attempts to pump his wells dry. Fluid left in the shot hole and well up over the sand face is an excellent retarder against paraffin. By observing these, and other precautions which can be detected locally, the operator will obtain good results from his air recovery methods. Most important of all, he will protect his sand against paraffin deposits which invariably prove a menace to future production.

TRET-O-LITE

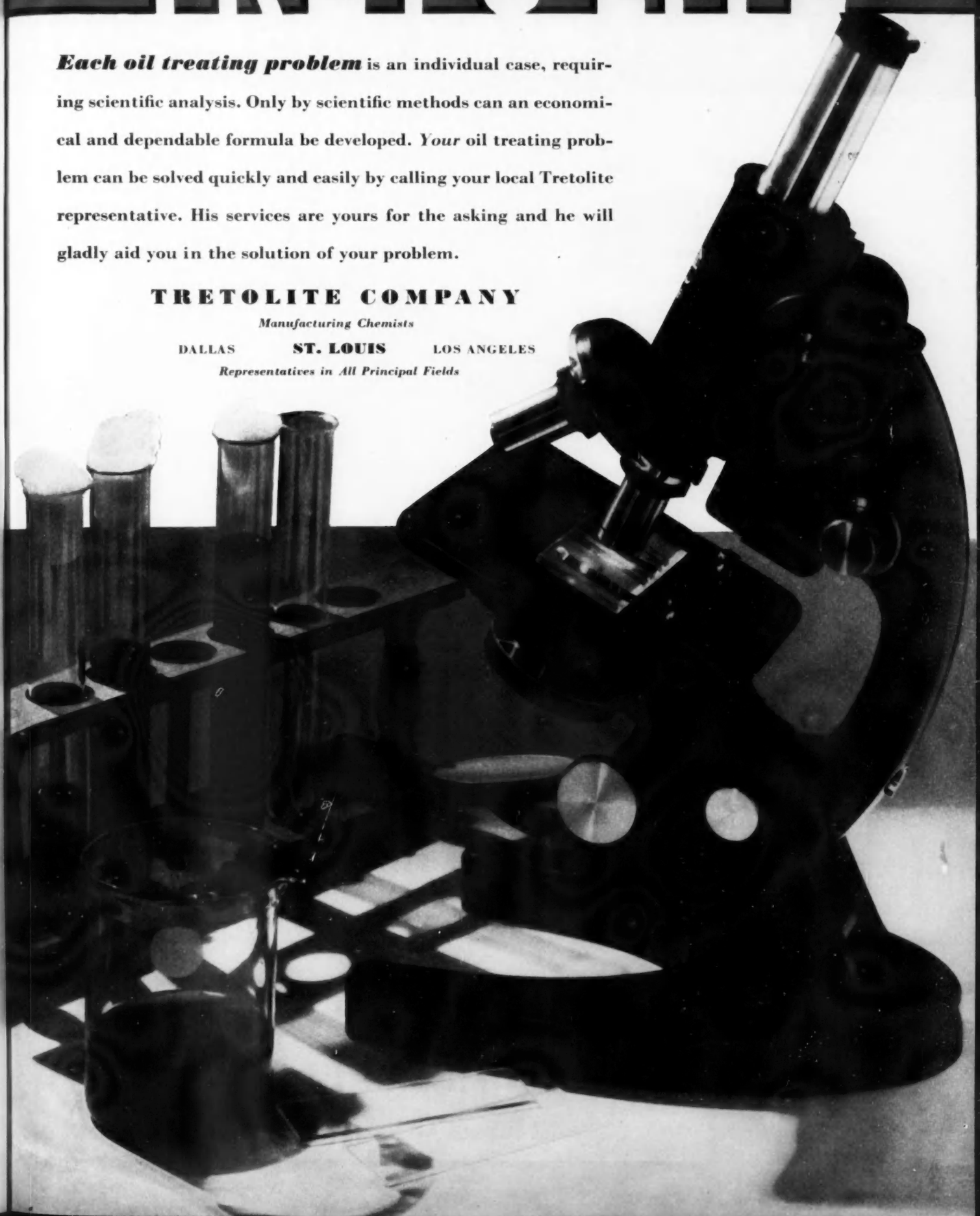
Each oil treating problem **is an individual case, requiring scientific analysis. Only by scientific methods can an economical and dependable formula be developed.** ***Your*** **oil treating problem can be solved quickly and easily by calling your local Tretolite representative. His services are yours for the asking and he will gladly aid you in the solution of your problem.**

TRETOLITE COMPANY

Manufacturing Chemists

DALLAS **ST. LOUIS** LOS ANGELES

Representatives in All Principal Fields



A NEW NATIONAL O

FOR LOWER LIFTING COST IN

TYPE
TU104G-HD10TP

DOMESTIC
EXECUTIVE OFFICES
PITTSBURGH, PENNA.
•
GENERAL SALES OFFICE
TOLEDO, OHIO
•
DIVISION OFFICES
FT. WORTH, TEX. • TULSA, OKLA.
TORRANCE, CALIF.

THE NATIONAL

UNIT PUMPER

T IN THE SHALLOW FIELDS

The new type TU104G-HD10TP National Unit Pumper broadens the line of small National Pumpers, facilitating selection for specific loads and conditions. This unit has a general construction similar to Heavy Duty National Pumpers with Sykes Herringbone Steel Reduction Gears, Anti-Friction Bearings throughout, Service Brake and Walking Beam Adjustment.

It is built to operate with a minimum expenditure of power and with little attention and maintenance. In addition, fixed charges are lowered due to a favorable combination of longer life and a moderate first cost.

For further details ask for Descriptive Bulletin No. 289, or see your nearest National Representative.

GEAR TRAIN TU104G-HD10TP PUMPER

BRIEF SPECIFICATIONS

API safe load of walking beam, pounds	6000
Polished rod strokes, inches	18, 19½, 21½, 24
Maximum counterweight effect at maximum polished rod stroke, pounds	4300
Reduction Gear:	
API peak torque rating at 20 SPM., inch pounds	24,300
Over-all gear ratio	29.2
Crankshaft diameter at bearings, inches	3¼
V-belt sheave pitch diameter, inches by number and section of belts	18 x 3B
V-belt sheave pitch diameter, maximum, inches	18
Well end working centers, inches	36
Length of base	5' 7"
Width of base, inches	15
Width of base at Samson post, inches	35
Height bottom of base to top of beam	6' 6¾"
Walking beam size and weight, CB section	10 x 21 pounds
Weight, regular equipment less extension base and counterweights, pounds	1925
Weight, PV-39A beam counterweights, each	410

L **ONAL** SUPPLY COMPANY

EXPORT

THE NATIONAL SUPPLY CORPORATION
30 ROCKEFELLER PLAZA
NEW YORK, N. Y. . . . U. S. A.

•

RIVER PLATE HOUSE
12 SO. PLACE, LONDON, E. C. 2
LIMITED LIABILITY

•

PLOESTI, ROUMANIA

•

MARACAIBO, VENEZUELA

Up-Ended Boiler Makes Pressure Treater for Crude

A KANSAS operator, finding it desirable to heat-treat his production, designed and constructed a lease treater capable of handling 600 or more barrels of fluid per day. A standard boiler serves as the nucleus of the design, with additive equipment being 3-inch piping, connections, welded nipples, gauges, and control and safety valves. For added efficiency the operator constructed a simple manifold type of heat exchanger which is proving effective.

Considerable of the production in some of the lime areas of Western Kansas requires heat treating, and in some instances, chemical treating. In the Gorham pool, Russell County, where the described treater is installed, it has been found necessary to heat-treat Kansas City-Lansing production from seven wells, and at the same time to chemically treat crude from one of the producers. Chemicals are added automatically at the wellhead, while heat is applied in the constructed unit. While it is usually only necessary to treat in colder months, the type and state of the production determines the manner and extent of treatment.

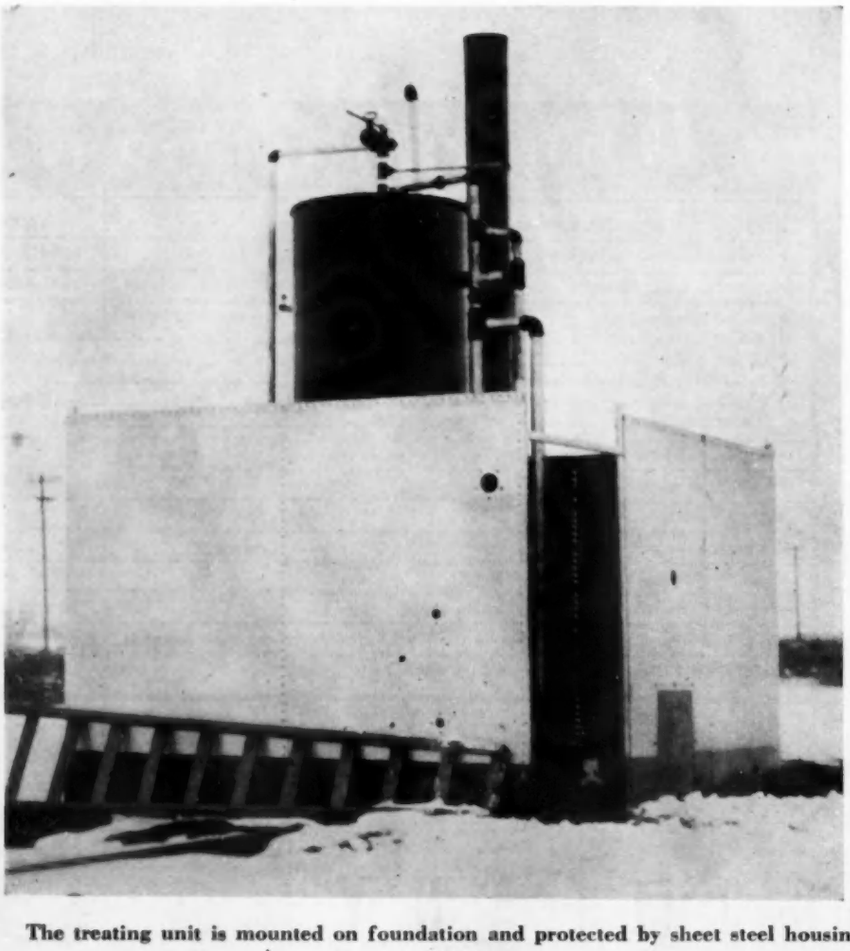
To change and equip the standard boiler for use as a treater, the operator first removed all flues. From this stage the boiler has been reconstructed with the intention of up-ending the completed unit so that the firebox is next the ground and the dome is horizontal. The new flues were placed horizontally within the dome, there being 40 two-inch flues welded in place. A concrete foundation seats the unit.

Input is at the underside of the dome in the unit's vertical position. Free gas entering the treater with the production is cut out to a considerable extent by a baffle arrangement in the dome section, the gas then being diverted past the treater. Production, after being heated in the base of the unit, is filtered under pressure through two feet of excelsior or hay. Following a slow flow through the treater, gas is bled off at the top, crude at the next lower connection and water next below.

A thermostat controls the temperature of the treater by controlling the volume of casinghead gas used for fuel. The thermostatic connection is made just above the dome, the operating temperature being from 120° to 135° F. Gasoline could be used initially as fuel, or until the treatment frees sufficient gas from the crude to assure the reaction to be self-supporting; or, the treater can be fueled with casinghead gas from a separate lease system.

Treating is accomplished under a back pressure of 13 to 15 pounds per square inch, constantly held against the treater. A relief valve, at the top of the unit, is set to open at 50 pounds pressure. A protected gauge glass, mounted on the side of the boiler, shows the water-oil contact.

Production to the treater is through a heater exchanger where incoming crude acquires increased temperature from treated oil discharged from the unit. To effect this heat transfer, the operator has constructed a dual header, 90 feet in length, each side being of four-inch pipe with four pieces of one-inch running from end to end to furnish the secondary conduit. This manner of heat transfer has proven highly efficient. When passing 75 barrels of oil and 450 of water from the wells, a check of the temperatures in the two systems showed only a slight difference.



The treating unit is mounted on foundation and protected by sheet steel housing.

NONE BETTER *at Any Price!*

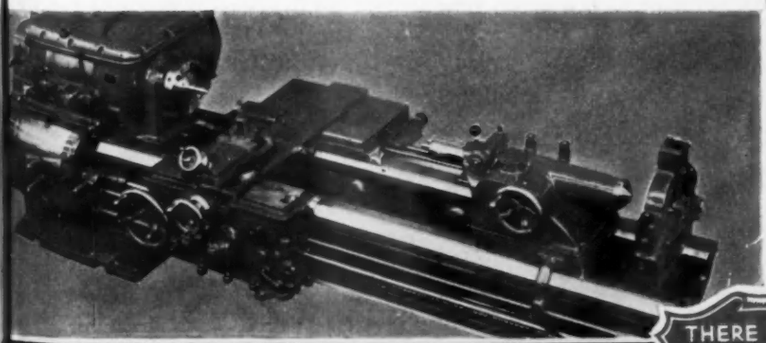
ALL AXELSON PRODUCTS ARE ENGINEERED FOR BETTER SERVICE

Over a period of nearly fifty years purchasers of machinery and equipment bearing the circle A trade mark have found a better quality, a better service, and usually at a competitive price. To Axelson's background of experience is added the alert, progressive craftsmanship of men with modern ideas. The dependability and long life characteristic of Axelson Pumps, Sucker Rods and Lathes reflect the fine workmanship of skilled mechanics with pride in their craft.

Axelson's three classes of Deep Well Plunger Pump represent the oil industry's most complete line. Axelson pioneered the standardization of pump parts a quarter of a century ago. This standardization made an unlimited number of interchangable pump combinations possible. Today Axelson can supply the right size and type of pump for any pumpable oil well in the world.

A LATHE DESIGN FOR ALL-AROUND OIL FIELD SHOP OPERATIONS

Axelson 24-Speed Selective Geared Head Heavy Duty Lathes will give the finest service irrespective of whether turning the heaviest roughing cuts or the most accurate precision work. Many of the leading oil companies maintenance departments have standardized on Axelson Heavy Duty Lathes.



SUCKER RODS THAT GIVE FULL SERVICE

Axelson is building Sucker Rods and Couplings to meet successfully the increasingly difficult well requirements in every field throughout the world. Special manufacturing methods and steel specifications assure longer life and greater field service for every rod. You will find Axelson Sucker Rods will help reduce your pumping cost with the least loss from "down" time.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON

DEEP WELL PLUNGER PUMPS · SUCKER RODS

AXELSON MANUFACTURING COMPANY – P.O. BOX 98, VERNON STATION, LOS ANGELES · ST. LOUIS · 50 CHURCH ST., NEW YORK · TULSA · MID-CONTINENT AND EASTERN DISTRIBUTOR: FRICK-REID SUPPLY CORP. ROCKY MOUNTAIN DISTRIBUTOR: GREAT NORTHERN TOOL & SUPPLY CO. · FOREIGN REPRESENTATIVES: "COSMOS" SOC. IN NUME COLECTIV, BUCHAREST, ROUMANIA · DIRECT FACTORY REPRESENTATIVE BUCHAREST, ROUMANIA · INDUSTRIAL AGENCIES, LTD., SAN FERNANDO, TRINIDAD, BRITISH WEST INDIES · FACTORY REPRESENTATIVE, MARACAIBO, VENEZUELA · AXELSON MANUFACTURING CO., BUENOS AIRES, ARGENTINA

THE FIRST 10

"CATERPILLAR" DIESEL TRACTORS

...and they're still going strong!

You can expect long-term, economical service from a "Caterpillar" Diesel Tractor. These first ten tell you that! Yet what they have to tell you is *only the beginning.* Because, as dependable and serviceable as these machines have been, today's "Caterpillar" Diesels are even more so!

These are not only the first Diesel tractors built by "Caterpillar"—but the *first* practical Diesel track-type tractors *ever* constructed. Each now has thousands of hours of hard work behind it . . . *and is still putting out low-cost power!* Here is ample evidence that the basic "Caterpillar" design and construction were *right* from the start. And while they are basically unchanged, they have been improved through these ten years of experience!

Today, for example, you get "Hi-Electro" hardening of the track roller-rims and shafts, track-pins, cylinder-liners, crankshaft, and such parts that must fight the most wear. And today's "Caterpillar" Diesel Engine gives you *more than ordinary Diesel economy* — through its ability to operate efficiently on non-premium fuel!

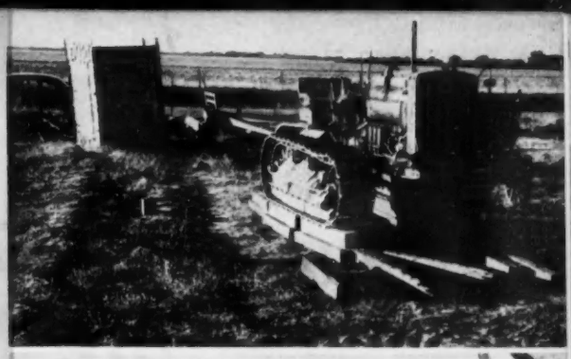
As a power-user, you owe it to yourself to know more about these first ten "Caterpillar" Diesel Tractors and others of the *tens of thousands* that have come after them. Write *today* for a FREE copy of the 32-page book entitled "1,000,000 Hours of Diesel Satisfaction."

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR

ENGINES AND ELECTRIC SETS TRACK

No. 1. After nine years of the heaviest kind of jobs — contracting and logging — this "Caterpillar" Diesel Tractor still does a full day's work on the lumbering operation of Howell & Howell, Quincy, Calif.



No. 2. In 7000 hours of operation, this "Caterpillar" Diesel saved W. C. Schuder & Son, Woodland, Calif., $3750 on fuel! Still on active duty — pulling such heavy loads as three 5-bottom 12-inch plows.

No. 3. Some of the world's heaviest pulling is found in the sugar-cane fields. This "Caterpillar" Diesel Tractor has had 18,683 hours of it — and is still good for many thousands more, according to the Oahu Sugar Co., Waipahu, Oahu, T. H.

No. 4. The engine of the No. 4 "Caterpillar" Diesel Tractor is powering this washing machine on a gold-and-gravel operation near Caledonia, Va. Runs 10 hours a day on 3½ gallons of fuel an hour. Operated more than 30,000 hours!

No. 5. Started out on the Mississippi levees for Harry Rodgers, Colfax, La. Engine later turned into a power-unit and has driven two cotton-gins and a lumber-planing mill. Now powering a drag-line. Estimated operation; 35,000 hours!

No. 6. The details on this machine are included with No. 10 below.

No. 7. More than 16,640 hours behind this seventh "Caterpillar" Diesel which went to work in December, 1931. Has probably spent most of its life to date on road-building and maintenance. Still at work for its original owner: Georgia State Highway Department.

No. 8. The details on this machine are included with No. 10 below.

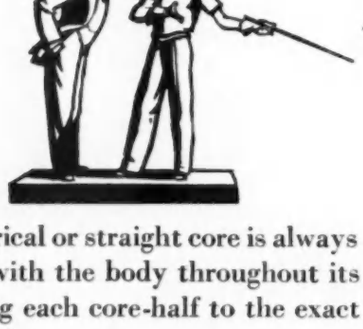
No. 9. After five years of construction work, starting in 1932, this machine was leased for farming and construction. Still on the job! Owned by E. C. Hale, of Circle, Mont.

No. 10. This, and No. 6 and No. 8, were bought by Dumon & Vandervin of Belgium, in 1931. Helped build the Albert Canal and were still at work as late as March 30, 1940. War conditions prevent obtaining complete details of their long service-record.

PILLAR DIESEL

ET TRACK-TYPE TRACTORS • ROAD MACHINERY

How Wear and Cutting are further retarded in the Mission Plug Valve because of its cylindrical core



You can see that straight-sided core will fit perfectly.

The Mission cylindrical or straight core is always in perfect contact with the body throughout its area due to grinding each core-half to the exact curvature of the body.

Since the Mission core is split through the center, clearance is provided which prevents wedging.

A tapered plug cannot fit its body as snugly as a Mission core unless it is wedged — then you have difficult turning.

Obviously, the fit of the Mission core will maintain a satisfactory lubricated seal longer. This is further assured in the Mission valve by grease grooves which completely encircle each port. *Satisfy yourself — test a Mission Plug Valve.*

MISSION MANUFACTURING CO.

HUMBLE ROAD • HOUSTON, TEXAS

EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK

Determination of Factors Affecting Reservoir Performance

By M. MUSKAT
Gulf Research & Development Company

WHAT data should be taken in the development of an oil field to make possible its most effective exploitation? The answer to this question is in effect already available in petroleum engineering literature. It has, however, been given heretofore in piecemeal fashion, i. e., in individual papers on core analysis, bottom-hole pressure measurements, etc. The accompanying article is a somewhat more systematic discussion emphasizing and correlating the uses of various types of data rather than the techniques for their empirical determination. No pretense is made that newly discovered research results are being presented. Rather this article consists largely of a restatement of well accepted observations from perhaps a different point of view than is usually taken.

A review is given of the various types of production-engineering data which should be taken during the course of development of oil and gas reservoirs. These data are discussed from the point of view of their application to problems of reserves estimation, well completion, control of production performance, and secondary recovery operations.

This paper was presented at the Annual Meeting of the American Petroleum Institute in Chicago last November by permission of the executives of Gulf Research & Development Company.

THE first type of data, and in some respects the most important, which should be gathered in the development of an oil field is that providing as quantitative an estimate as possible of the original oil reserves. Although, as will be seen later, there are possibilities of indirectly determining these reserves by observing the performance of a field after it has been fully developed, the most direct method for calculating the reserves demands data which can be obtained only while the wells are being drilled. It is simply for this reason that the gathering of these data must be placed first in the list. Before entering into the detailed discussion of this question, it should be noted that throughout this paper the oil reservoir will be considered as a unit. While in the case of a number of the problems discussed, as the application of core analyses to well completion, immediate use of individual well data may be made in the handling of these particular wells, the maximum benefits will even here be derived if equivalent data are taken at a number of locations over the entire area of the field.

Specifically, the magnitude of the original oil content of the producing formation must be known in order to predict: (a) the natural oil recovery and/or (b) the advisability or probable success of secondary recovery methods. After establishing the basic characteristics of the mechanics of the production, i.e., whether it is a water drive, internal gas drive, or combination drive field, reasonably accurate recovery factors can generally be applied to the original reserves to predict the natural ultimate recovery. While other factors also enter into the detailed evaluation of oil properties, the magnitude of the recoverable reserves is obviously an essential element in oil field appraisal.

A knowledge of the quantity of oil originally in place is equally useful when considering the application of secondary recovery methods. For example, if the original reserves are known, the amount of oil remaining in the pay at the time the secondary recovery operations are contemplated will be given at once by merely subtracting the accumulated production. Except for additional drilling and coring there is no other way to determine the residual oil with reasonable accuracy after a field has been fully developed and materially depleted. While the amount of residual oil is not the only factor to be considered in the question of secondary recovery it is an extremely important one. Obviously if the residual oil content should be less than certain limiting values secondary recovery methods would be unprofitable no matter how well suited to such operations may be the physical nature of the pay.

The consideration of the element of residual-oil content may provide at least a partial explanation for the relatively disappointing oil recoveries from some of the waterflooding projects in the Mid-Continent area as compared to those in the Bradford district. For even though the higher price of the Pennsylvania crude has meant that the abandonment production rates under natural recovery have been generally lower in Pennsylvania than in the Mid-Continent area, the considerably lower permeabilities of the producing pays in Pennsylvania have nevertheless probably involved materially smaller degrees of depletion when the natural-recovery production finally did have to be discontinued. The consequent greater residual-oil contents in the Pennsylvania

pays thus naturally provided the higher recoveries from water-flooding than the Mid-Continent sands which were more completely exhausted by the natural-recovery methods at the time of abandonment. Since the inherent efficiency of the water flood does not vary rapidly with the sand permeability, this factor of the residual-oil content may well give one of the reasons for the frequently expressed practical observation that the highly permeable pays are not so favorable for water flooding.

It will be obvious without analysis that the same general principles will apply to the question of gas repressuring.

What is needed to determine directly the original oil reservoir content? The answer clearly depends on the method of determination. Of these there are essentially two, namely, that based on static, i.e., volumetric data, and that involving the dynamical production history of the reservoir.

Reserves Estimates from Initial Static Data

The calculation of reserves here referred to simply consists in the process of multiplying together the area of the pay, its thickness, its porosity, and the oil saturation.

The delineation of the areal extent of a field obviously can be made only by the development of the dry-hole boundaries of the reservoir. However, the determination of the effective productive pay thickness involves far more complex, though perhaps not as costly, procedures. The geological inspection of cores and cuttings must, of course, still be considered as a basic mode of approach. But in recent years powerful supplementary tools have been developed which provide much more quantitative data. Of these the electrical well-log is probably the simplest and most straightforward in analyzing and identifying the various strata in a producing section. However, in virgin territory or new fields, the resistivity log will basically distinguish only between highly conducting—from an electrical standpoint—and poorly conducting beds, that is between salt water and either gas- or oil-bearing strata. And while the so-called "porosity logs" do add considerably to the interpretation of the resistivity logs, even the combination can by itself tell but little about the numerical values of the porosity or the distribution between the saturations of the various fluid components present in the pore space.

What is needed to make the most of the electrical-log data is some kind of a calibration curve, as it were. Such a calibration would make possible the translation of the various significant and typical electrical anomalies into equivalent sand and fluid-content characteristics. Once this correlation and equivalence has been established by comparing the electrical logs with the directly determined sand and fluid data for a few typical wells in a field, the electrical logs alone could then be used in subsequent wells with but little uncertainty.

The direct determination of the sand and fluid characteristics of producing strata by which one may calibrate the electrical-log data obviously involves that body of procedure generally termed "core analysis." Of these procedures that giving the porosity is decidedly the least subject to uncertainty. However, the determination of the nature of the virgin fluid distribution is beset with a number of complications. These arise from the fact that the core as brought to the surface will have lost some of the fluid it had when in the core barrel at the point of coring, and that even at that point the fluid which did fill it will in general be different from that permeating the sand before it was penetrated by the drill. While the first effect can be obviated by the use of the recently developed pressure core barrels,[1] or can be corrected for by means of direct laboratory tests, the second requires more detailed and less clear-cut treatment. For the flushing action exerted on the original fluid content of the core by the drilling fluids is a phenomenon difficult of study by laboratory methods at the surface. Nevertheless it is felt that a fair degree of approximation to the determination of the original fluid distribution can be attained by applying salinity tests to the interstitial water or by the use of tracers in the drilling fluid, to correct for the contamination of the core during drilling.[2] Once the original water saturation has been determined, the oil content of the core in the virgin field can be taken as the difference between the total pore volume and that of the connate water, except where the direct measurement of the oil saturation shows the core to be at the oil-gas interface or entirely in the gas-cap.

When the oil saturation, sand porosity, effective pay thickness, and productive areal extent have been established, the determination of the original total oil reserves is, of course, given by the mutual product of these factors.

While a knowledge of the total original oil content is perhaps of greatest value in determining the advisability of undertaking secondary-recovery operations after the natural-recovery history of a field has been completed, the evaluation of the primary recovery stage in the life of a field obviously depends largely on the magnitude of the recoverable reserves. From the point of view of initial field data the recoverable reserves can be estimated from the total oil content by the application of a "recovery factor." A simple rough approximation to the recovery factor will be given by the fraction of the total original oil saturation represented by the unaccounted for free space in the core observed on analysis at the surface, if the conventional core barrel has been used. For this free space results from the expulsion of the fluids in the core when at the bottom of the hole following the release of gas as the core is brought to the surface and the saturation pressure drops to atmospheric. This process is evidently very similar to that which will take place in the normal production history of the oil-saturated pay. The question of the accuracy of this simple estimate arises from the different rates of pressure decline in the two cases, and the possibility that some of the gas-expelled fluid may have come from the drilling-fluid contamination.

Both of these uncertainties can be largely removed by performing in the laboratory a pressure-reduction experiment on cores containing the same fluid distribution as previously established to apply to the uncontaminated core. Moreover, the rate of pressure decline can be maintained in the region where the recovery is insensitive to the absolute value of the rate.[3] Multiplying the total original oil content by the recovery factor will give the ultimate recoverable reserves.

Of course, the recoverable reserves just referred to will be those derivable only by gas-drive production without the aid of natural-

[1] D. B. Taliaferro and R. E. Heithecker, A.P.I. Drilling & Production Practice, p. 53, 1939; also B. W. Sewell, loc. cit. p. 69.

[2] The techniques of core analysis have been described in the literature many times. Perhaps the most recent complete discussion of the subject is that of H. C. Pyle and J. E. Sherbourne, A.I.M.E. Techn. Pub. No. 1024, (1939) where other references are also listed.

[3] H. G. Botset and M. Muskat, Trans. A.I.M.E. 132, 172 (1939).

water drives or gas-cap repressuring. The recovery factors for gas-cap-repressuring operations or for systems subjected to active water drives can be determined by direct laboratory experiments, of the same type generally performed in connection with the corresponding secondary-recovery studies.

It is also to be understood that the oil-recovery estimates based on such methods as indicated above must be corrected for the shrinkage losses resulting from the release of the dissolved gases. Here we see already one of the specific reasons why one should take initial bottom-hole pressures and determine the gas saturation and shrinkage of the oil immediately upon completion of the first few wells in a new field. Aside from other information to be discussed later, such data will not only give the correction factors to be applied to the directly observed recovery factors but will also be necessary for the proper laboratory experimentation with the cores when measuring the oil expulsion under various conditions of interest.

Finally, it is to be noted that the recoverable reserves estimated by the methods outlined here will be those corresponding to the ultimate physical recoveries. The economic ultimate recoveries will evidently be less than these, since it will not be profitable to continue to produce the oil until the reservoir pressures have been completely reduced to atmospheric. In general, however, the difference between the economic and physical ultimate recovery, for any type of production mechanism, will be rather small, unless operating costs should for some reason be exceptionally high or well spacings excessively great and thus force the abandonment of the production relatively early in the physical life period of the reservoir.

Data Required for the Dynamical Methods for Oil Reserve Estimation

As already indicated, the dynamical methods are those based on the production history of the reservoir. In their simplest form those methods consist in the extrapolation of directly observed field-production data to some point representing the end of the productive field-production data extrapolated graphically until the rates are too low for profitable operation, the area under the rate vs time curve life. Such data may be merely giving the ultimate reserves or recovery. Or, the integrated area, that is, the cumulative production may be plotted directly against the age of the field, and the ultimate reserves taken as the probable asymptotic maximum of the curve. A more scientific approach involves the additional observation of the reservoir pressures at periodic intervals and observing and extrapolating their decline. This may be carried out by plotting the pressures versus the time or versus the production rate or accumulated production. Graphical extrapolation to atmospheric pressure or a preassigned abandonment pressure again is the means of deciding on the ultimate recovery or reserves.

As long as one does not have a physical and theoretical basis for guiding these extrapolation procedures they will be reasonably safe only if the extrapolation is of limited extent, which means when the field has practically completed its production history and the reserve estimation problem is no longer of great interest. Moreover, any major changes in the manner of operating the field may so modify an early decline curve as to cast doubt upon an original extrapolation and necessitate waiting another extended production period until a new extrapolation may be made. Furthermore, with the advent of proration restrictions the life periods of fields have been forcibly extended, thus making limited decline curve segments still more hazardous of extrapolation. Finally, the increasing frequency with which active water drives are becoming associated with oil reservoirs, because of earlier recognition of their presence and the effect of restricted field withdrawals, has created the problem of estimating reserves when neither the pressures nor production rates may decline appreciably over extended periods.

To avoid these difficulties of the intuitive extrapolation of production data for the determination of oil reserves a theoretical approach to the problem may be used. A number of detailed procedures have been proposed for this purpose.[4] But in principle they are all essentially equivalent. They consist in representing the oil reservoir as a tank of fixed or variable—due to water encroachment—volume at a uniform pressure equal to the area-weighted reservoir pressure of the field. Throughout the production history the gas and oil are assumed to be at equilibrium. By applying conservation laws—material and volume balances—to the liquid and gas contents of the system and to its volume, algebraic relationships are constructed connecting the initial values of the oil and gas contents to the cumulative oil and gas withdrawals and possible water encroachment and oil occlusion. By inserting into these equations observed values of cumulative withdrawals and the corresponding reservoir pressures, for a number of time intervals depending on the number of basic unknowns, these latter, which will include the oil and gas reserves, may be calculated by simple algebraic manipulation.

These methods permit the calcualtion of original oil and gas reservoir contents, the reserves at any time previous to or at the time corresponding to the last observed field data, and for any future data if the future gas and oil production be assumed. The future pressures corresponding to these production data can also be computed. In fact, these procedures are equivalent to the calculation of theoretical production history or decline curves for the reservoir with the original oil and gas reserves and possible rate of water encroachment constants so adjusted as to force agreement at the several time intervals where production and pressure data have already been observed.

Aside from the data on gas and oil production and reservoir pressures which these methods involve, information regarding the physical characteristics of the reservoir fluids is also essential. These include the solubility curve of the gas in the crude, the shrinkage of the crude as the gas is released, and the ideal gas deviation factors of the gas. The techniques for sampling the reservoir fluids and analyzing the samples to give the above data are well established and straightforward.

Of course, such calculations referred to above are not fool-proof. In fact, at the present time it is questionable if they are more trustworthy than the static volumetric reserves determination. However, since they are basically sound from a physical point of view the necessary field and laboratory data should be gathered if only to test out the theory and develop whatever modifications will improve its

[4] S. Coleman, H. D. Wilde, Jr., and T. V. Moore, Trans. A.I.M.E. 86, 174; (1930). D. L. Katz, Trans. A.I.M.E. 118, 18, (1936). R. J. Schilthuis, loc. cit. p. 33. R. L. Huntington, Oil Weekly 83, p. 25, Oct. 12, 1936. B. H. Sage and W. N. Lacey, A.P.I. Drilling & Production Practice, p. 81 (1937).

accuracy. Indeed it seems certain that only by checking and comparing the results given by both the static and dynamical methods will a completely satisfactory solution to the reserve estimation problem be attained.

Control of Production Performance

In the discussion of this phase of the subject we shall confine ourselves to the physical aspects of the production process. We do not mean to imply thereby that nothing else is of equal importance. On the contrary, we shall assume that the value of keeping complete records and taking full data regarding the character and disposition of flow strings, of the cementing operations, of the drilling history, and of the general mechanical equipment of the well is so obvious that such matters will always be taken care of as a matter of course.

Well Completion

Before the mechanics of well completion can be undertaken one must obviously decide the location of the completion. This question frequently arises as one observes in the drilling mud or cuttings "shows of oil" when the drill penetrates strata which may lie above these formations where oil saturation is definitely anticipated. The most direct procedure for evaluating these "shows" is evidently by so-called "formation testing." This is essentially equivalent to improvising a temporary completion of the well at the stratum in question and sampling the fluids from the stratum or observing directly its productivity.

Unless the sand to be tested is unconsolidated, core-analysis data will here, too, provide a definite solution to the problem and at less cost than is involved by the direct formation testing. The specific core measurements pertinent to the determination of the productivity of the sand in question are those on the distribution of the fluid contents, previously discussed, and the sand permeability. The former will make possible the prediction of the nature of the fluid which will be produced from the sand. Studies in the last several years[5] of the flow of heterogeneous fluids through porous media have revealed not only the qualitative features of fluid mixture flow through sands but have established many important quantitative relationships as well. These investigations show, for example, that if the free gas saturation of a sand (unconsolidated) is of the order of 35 percent or greater the production will be, for all practical purposes, exclusively gas. Furthermore, if the water content exceeds 50 percent the steady state production will contain appreciable quantities of water except when the gas concentration exceeds 35 percent. And in order for the flow stream to be oil alone—except for its dissolved gases—the oil saturation must exceed 50 percent. The various fluid ratios in the flow stream are also determined by these fluid-content distributions. Evidently then, if one knows the fluid saturations as determined by the analysis of the cores he will be able to predict whether from a production standpoint the sand will be a gas producer, a water sand, or an oil producer.

Even if the fluid saturation analysis should show that the fluid stream passing through the sand in question will be largely or exclusively oil, completion of the well at this sand still will depend on whether the rate of production would be sufficiently high for profitable operation. Here the determination of the permeability of the cores, together with the reservoir pressure and viscosity of the oil, will readily provide the answer by means of simple calculation. While the latter will not give results of high precision, the predicted production rate will certainly be of the right order of magnitude. Thus direct testing of the formation will be unnecessary except as the core-analysis data show the sand to be commercially productive of oil and the well is completed in the sand as an oil producer.

These same core analysis data will, of course, also provide valuable guides in determining the completion details. They will indicate the positions where blank liners should be set to shut off water strata or barren gas sands which may be intercalated between the oil producing pays. Of course, as indicated earlier in this discussion, electrical logs can be used for the purpose of identifying the various strata once the key for their interpretation has been established by comparison with core-analysis logs.

If the producing section appears to be loosely cemented and easily disintegrated a grain-size analysis of the cores should be made before the well is completed. This information will serve to guide the choice of liners or screens or gravel packs to be used in the original completion so as to avoid sanding of the well and disintegration of the open face of the sand.

The data and procedure used in deciding whether the original show of oil represents a commercial producing pay may also be applied in predicting the initial productivity of the well after completion. Here again great accuracy is not to be expected. However, if the observed initial production capacity should be but a small fraction of that calculated, the inference can be safely drawn that the well has been mudded or plugged in some manner during completion.

Data Concerned with Production Histories of Oil Fields

It has already been indicated that original bottom-hole pressures will be useful in calculating the initial productivity of a well and as a starting point in applying the dynamical methods for the estimation of the oil reserves. Analyses of the fluids produced from the well also enter the problem of reserves calculation.

The saturation pressure of the crude should, of course, also be determined. It is a measure of the gas and gas energy available for the gas-drive expulsion of the oil. Comparison of the solution gas/oil ratio with the gas/oil ratio of production will indicate the efficiency of the production from the point of view of the use of the reservoir gas energy. If the crude oil is undersaturated consideration must be given to the possibility of controlling the withdrawal rates so as to make immediate use of edge-water encroachment and transform it into an effective water drive. Otherwise the reservoir pressures will drop very rapidly to the saturation pressure and result in the development of a gas-drive type of production.

If the well has been completed in a gas cap detailed composition analyses should be made of the gas and whatever condensate may be produced with it. In addition the reservoir temperature should be determined. By direct experimental measurement or by calculation,

[5] R. D. Wyckoff and H. G. Botset, J. App. Phys. 7, 325, (1936). G. L. Hassler, R. R. Rice, and E. H. Leeman, Trans. A.I.M.E. 118, 116, (1936). F. B. Plummer, J. C. Hunter, Jr., and E. H. Timmerman, Oil & Gas Jour. 35, p. 42, April 8, 1937. E. N. Dunlap, Trans. A.I.M.E. 127, 215, (1938). L. S. Reid and R. L. Huntington, loc. cit. p. 226. N. Van Wingen, Oil Weekly, 91, p. 26, Oct. 10, 1938. M. C. Leverett, Trans, A.I.M.E. 132, 149, (1939). M. C. Leverett and W. B. Lewis, A.I.M.E. Tech. Pub. No. 1206, (1940). H. G. Botset, A.I.M.E. Tech. Pub. No. 1111, (1939).

with the aid of equilibrium-ratios data, information may be obtained regarding the likelihood of a crude being present farther down the flanks of the structure, and its composition and gravity if it is present. Conversely, an analysis of the crude and gas from a well on the flanks of a structure penetrating a fully saturated oil pay will permit the prediction of the composition of the gas in the gas cap if a free-gas zone should be present at the crest of the structure. Such information will clearly be of value with regard to the question of field development and additional drilling. At the same time the analyses of original gas and distillate samples may be applied to predicting the pressures at which distillate will be condensed in the sand, if the initial reservoir pressure exceeds the dew-point pressure, and the amount of condensate dropping out in the sand as the reservoir pressure falls below the dew point. The value of returning the dry gas to the formation can be computed from these data, as can also the optimum separator conditions in reducing the reservoir fluids to atmospheric. Of course, the composition analysis of the reservoir fluids also will provide the necessary data, together with the appropriate equilibrium ratios, for calculating the most desirable separator conditions and gasoline contents of the separator gases for a normal gas-crude oil producing formation.

It is hardly necessary to stress the desirability of taking periodically bottom-hole pressure and gas/oil ratio data after a field has been developed, in addition to their initial measurements. In fact, in most oil-producing districts such measurements are required by the various legally constituted commissions controlling oil and gas production in order to provide essential data for the promulgation of proration and conservation orders. However, regular bottom-hole pressure and gas-oil ratio surveys should be made frequently regardless of legal requirements. For as long as individual wells or the field can and do make their proration allowables, such surveys provide the only means of observing and judging the quality of the field performance. Both of these types of data are involved in establishing the mechanics of the production, that is, whether it be essentially controlled by a water drive, by an internal gas drive, or is appreciably affected by both. When the mechanics of the production has been established it is possible to calculate with greater confidence the future performance of the field and thus give information regarding such questions as future reserves, as already outlined, the length of the flowing life of the field in terms of time and oil recovery, and the advisability of pressure-maintenance operations. Of course, the individual gas-oil ratios will also indicate the efficiency of the production locally, and the extent to which a gas cap may be developing about the particular wells in question.

If the bottom-hole pressures over a field are plotted in contour form, much additional information may be derived. General regional trends of rising pressures towards the developed boundaries of a field are indicative of the location of an energy source for the production, either in the form of an edge-water drive or undeveloped oil reserves. Extended regions of uniform pressure usually correspond to a high degree of intercommunication throughout the producing section, either via an overlying gas cap or by virtue of the high permeability of the pay. On the other hand, steep gradients and large areal fluctuations in the reservoir pressure point to low-permeability regions in the pay zone and rather poor intercommunication between neighboring properties, unless widely different operating histories of the individual wells are known to be responsible for such fluctuations. Obviously, localized regions of low pressures are the reflection of higheer degrees of depletion of the local reserves, a situation also generally accompanied by localized highs in the gas-oil ratios. Of course, as already mentioned, the over-all weighted average pressures of the field will give perhaps the most direct evidence regarding the character of the predominating driving agents—water or gas—controlling the production. This type of application becomes especially favorable when one can observe the reaction of the field pressures to major changes in the field withdrawal rates.

Together with measurements of the static reservoir pressures, flowing bottom-hole pressure tests should be at least occasionally performed during the life of a field. These frequently find direct use in the adjustment of well potentials entering in proration-allocation formulas. However, additional application of the equivalent productivity factor data can be made in determining the size of pumping installations if the wells are being put on the pump. Moreover, the observation of any major decline in the productivity factor below its initial value will give evidence of plugging of the formation or hole and the need for remedial measures. Of course, this latter inference is to be drawn only if the drop in productivity factor is appreciably greater than can be accounted for by the natural increase in oil viscosity and decrease in the liquid permeability of the pay resulting from the normal depletion history of the producing sand. It is also to be noted that perhaps the most direct measure of the success of a well cleanout operation as well as of such processes as well shooting and acid treatment consists in the comparison between the productivity index before and after the treatment.

The types of data discussed above also serve to throw light upon the important problem of well spacing. While it may perhaps appear to be a rather unorthodox point of view, there is reason to believe that the only major physical factor involved is the uniformity of the producing pay. For if the oil saturated section is highly lenticular and non-uniform the well spacing must clearly be sufficiently close so as to effectively drain each major localized unit of the pay zone. By means of core analyses and bottom-hole pressure observations this question of uniformity can be readily settled, as already indicated previously. However, aside from this one factor, the problem of well spacing essentially reduces to one of economics. In particular, it involves the effect of well spacing on the balance between investment and operating costs as against the operating income rather than a variation of physical ultimate recoveries with the well spacing. On the other hand, the proper evaluation of these economic items does require a knowledge of the recoverable reserves per unit surface area or sand volume, the productivity factors of the pay, the properties of the fluids produced, and the nature of the production mechanism. From the point of view of actually planning well-spacing programs in a scientific manner these technical data ultimately play as important a role as those of a purely economic and accounting nature.

Although strictly speaking gas-cap repressuring or pressure maintenance bears little relationship to secondary-recovery operations, we

shall briefly refer to this subject in this section.

Gas-Cap Repressuring

Basically, of course, the process of attempting to retard the pressure and production decline of a field by injecting gas into a gas cap is a means of controlling the performance of a field during its primary productive life. As the term gas-cap repressuring implies, such an operation involves returning gas to the structurally high part of the oil-producing reservoir where it may develop or expand a zone of high gas concentration overlying the producing pay with higher oil saturations. By virtue of the gravity differential between the gas and oil, the gas accumulating in the cap will tend to remain segregated there and will be deterred in its natural tendency to channel through the oil-saturated zone to the low-pressure regions about the wells lower down on the structure. Thus in addition to its effect in simply retarding the reservoir-pressure decline by decreasing the net volumertic wthdrawal from the reservoir, the injection of gas into the gas cap serves to localize the energy supplied in a manner permitting a more efficient utilization of it as an oil-expelling agent. This effect usually is expressed by the remark that the gas-cap fluid acts as a piston on the underlying oil zone much as edge water along the flanks of a structure acts as an upward moving piston. At the same time, as the result of the gas remaining in the cap the higher degree of liquid saturation and smaller degree of gas channeling in the oil zone involves a higher liquid permeability in this zone and hence will give greater rates of flow of the oil down the flanks for the same pressure gradients and gravity head. Furthermore, the net gas-oil ratio will be reduced to the extent that the injected gas does remain in the reservoir. This reduction provides a direct measure of the efficiency of the operation.

If the pay is reasonably uniform and the reservoir structure has an appreciable closure there can be no question but that gas-cap repressuring is a physically sound method of improving field performance. As previously indicated, the uniformity of the pay can be ascertained from the core analyses and field pressure observations, and the degree of closure will be given by the drilling and well records. Gas-oil ratio and pressure data after the repressuring is instituted also will show the degree to which the field pressure is being sustained and the manner in which the gas cap may be expanding.

Gas-Recycling

By the term "gas-recycling" we mean the process of injecting gas into a sand after the primary-recovery stage has been completed in order to expel some of the residual oil. It is a real "secondary-recovery" operation.

As pointed out in the first part of this paper, the first question to be answered when considering any form of secondary-recovery operations concerns the amount of oil remaining in the sand when the natural-production history has ended. The answer evidently can be most simply obtained by subtracting the cumulative natural production from the original oil content, due account being taken of the shrinkage effects. The manner in which the initial reserves can be determined has already been discussed. The original estimates undoubtedly will be subject to adjustment and corrections in accordance with information gathered in the course of the natural-production history. However, from the point of view of the residual-oil-content estimate, core analyses of new wells that may be drilled as part of the recycling program will be subject to an uncertainty in the amount of residual oil flushed out by the drilling fluid, unless the pays are cored dry, and hence should be used with care and caution.

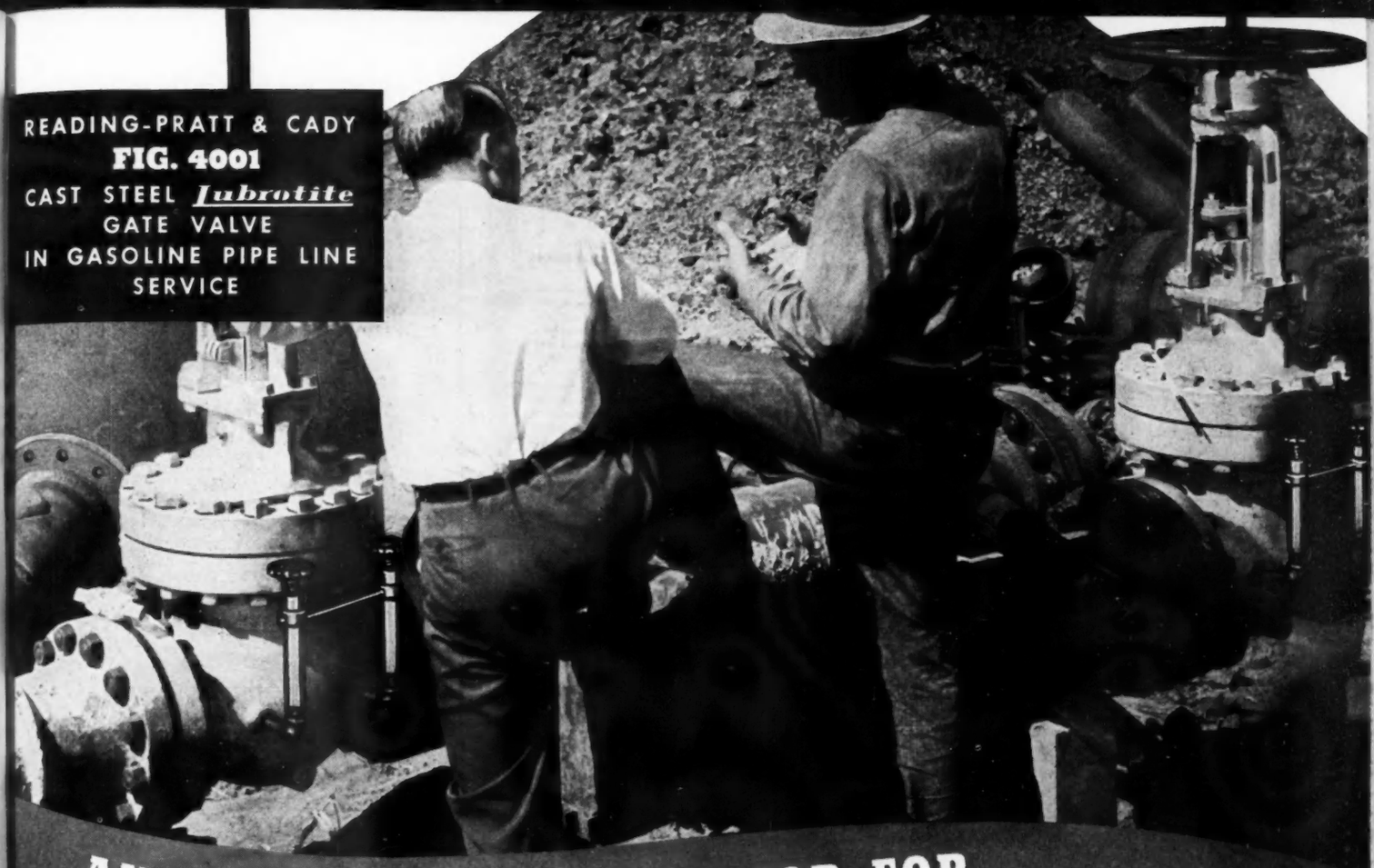
If there does appear to be enough residual oil remaining in the pay to warrant undertaking recycling operations, the manner of completing both the injection and oil wells should be guided by the core-analyses or electric-log data gathered during the original drilling development. For example, it may be reasonably assumed that the zones of high permeability will have been depleted more highly than those of low permeability. The former are those through which the injected gas is most likely to channel to the producing wells. Clearly attempts should be made to seal off these strata.

In following the progress of the recycling operations, it is obvious that gas-oil ratio data on the producing wells will show directly the efficiency of the process and the degree to which gas channeling may be developing. It should be noted, however, that in contrast to gas-cap repressuring, gas recycling will be relatively ineffective in increasing the recoveries which could be obtained from the original natural internal-gas drive if the latter could be profitably continued to complete physical depletion of the initial gas reserves. Rather the main value of gas recycling an oil field—without regard to the structural possibilities of gas-cap development—is derived from economic considerations. In fact, about all that the gas recycling will accomplish from a physical point of view is a flushing out at commercially profitable rates of the oil which normally would be produced even in the primary recovery stage at rates too low for profitable operation.

Water Flooding

The data involved in planning a water-flooding secondary-recovery program are essentially the same as those just discussed with respect to gas recycling. Here, too, the magnitude of residual oil content is the first criterion in determining the advisability of undertaking the secondary-recovery operations. Because of the greater flushing ability of water, as compared to gases, water flooding, in spite of its greater cost, may still be profitable with lower residual-oil contents than would be gas recycling. On the other hand, if the pay has already been subjected to a natural water drive and flood, gas recycling and even water flooding may be immediately eliminated from further consideration. However, if water-flooding operations appear to be practicable, use here, too, may be made of core analysis data in guiding the details of completion of both the injection and output wells with respect to shutting off by-passing channels. Moreover, these data will make possible the calculation of injection rates as a function of the surface pressure and thus assist in the choice of injection equipment and in the general planning of the program.

It may be noted, too, that there is no inherent value in the physical separation of the secondary- and primary-recovery operations. Especially under present circumstances where the allowable withdrawals from fields are generally restricted to be far below their potential production capacities it should be possible to take advantage of the natural water drive by suitable control of the water production and proper location of the producing wells. The flowing life of the field will be lengthened thereby, and all the



READING-PRATT & CADY
FIG. 4001
CAST STEEL *Lubrotite*
GATE VALVE
IN GASOLINE PIPE LINE
SERVICE

ANOTHER OIL COUNTRY JOB FOR READING-PRATT & CADY VALVES

HERE'S a new gasoline pipe line job.

The engineers specified that valves must stand up under all conditions imposed by gasoline pipe line service.

They chose READING-PRATT & CADY'S **Figure 4001,** CAST STEEL LUBROTITE GATE VALVES because the Lubrotite feature makes it certain that:

1. **The valves will resist corrosion**
2. **The seal will always be tight**
3. **The valves will open with minimum effort though operated at irregular and infrequent intervals.**

Reading-Pratt & Cady men are working constantly on valve problems of oil men. You will find it worthwhile to discuss your valve problems with them.

TRY *Lubrotite* GATE VALVES

LUBROTITES are a patented lubricated valve—easy to "load" with sufficient lubricant for a long period of service. One turn of the small lubricating hand wheel makes certain a tight seat, protects seat and wedge from corrosion and prevents jamming or sticking.

Write for a copy of the booklet "LUBROTITE—a New Gate Valve."

READING-PRATT & CADY
DIVISION · · READING, PENNSYLVANIA

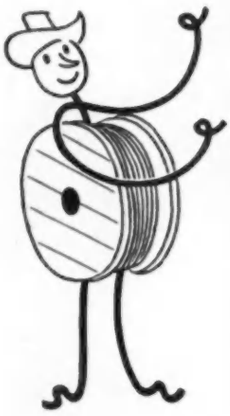
AMERICAN CHAIN & CABLE COMPANY, Inc.

FIRST CLASS
PERMIT No. 3247
Sec. 510, P. L. & R.
Kansas City, Mo.

BUSINESS REPLY LABEL
No Postage Stamp Necessary If Mailed in the U. S. A.

POSTAGE WILL BE PAID BY

Union Wire Rope Corporation
2104 Manchester Avenue
Kansas City, Missouri



MAIL THIS
If You Really Want The
DOPE on WIRE ROPE

No postage is required. Simply clip out the label above—paste to any card; write your name, your title, name of company and address on the other side, saying "Send me ROPE DOPE." It is not advertising and there is no charge for this periodical bulletin of current facts every wire rope buyer should know. 5

UNION WIRE ROPE CORPORATION
GENERAL OFFICES AND FACTORY:
2104 Manchester Ave. Kansas City, Missouri
Tulsa • Houston • Chicago • Salt Lake City
New Orleans • Monahans • Portland • Ashland, Ky.

UNION Wire Ropes
The "ULTIMATE LOW COST WIRE ROPE"

PETROGRAPHIC AND PHYSICAL CHARACTERISTICS OF SANDS FROM SEVEN GULF COAST PRODUCING HORIZONS

By M. T. Halbouty, B.S., M.S.,
Merit Oil Corp.

The material printed in this book was first published in The OIL WEEKLY in a number of installments, extending over a seven-week period. Because of the widespread interest and demand for copies, it is being presented in book form for the benefit of those who may wish to study or continue the research work of M. T. Halbouty, the author.

Size 5½" x 8¼" — Fabrikoid Binding
126 Pages Illustrated Price $1.50

Send check to THE GULF PUBLISHING COMPANY
P. O. Drawer 2608 Houston, Texas

costs associated with artificial water flooding will be eliminated, while at the same time the natural recovery may be greater than the total yielded by the uncontrolled primary-recovery period plus that recovered during the secondary-recovery operations. The same considerations apply to the comparison of the value of undertaking gas-cap repressuring early during the primary-recovery stage and that of deferring all gas injection until the natural gas energy has been dissipated by the internal gas drive. In fact if the exploitation program is developed so as to include the gas-cap repressuring during the primary-recovery phase there will be no need to plan for secondary-recovery gas-recycling operations.

Summary

The above discussions, it is hoped, will give an idea of what types of engineering data should be taken in the course of development and depletion of an oil-bearing reservoir. The stress upon the functional point of view, that is, upon the applications of the data rather than the techniques of the measurements, has led to considerable repetition. Perhaps, however, this very repetition will serve to emphasize the manifold uses to which the various types of data may be put. On the other hand, it is readily admitted that the treatment has been in many respects much more brief and cursory than the specific topics merit. Moreover, a number of questions pertinent to the control of well performance such as control of gas-oil ratios, water production, well location, and general well treatment have not been discussed at all.

Even in this summary we shall make no tabulation of the specific physical constants or characteristics whose uses have been reviewed here. To simply accumulate a list of numerical constants, which in many cases may involve costly techniques and great effort, just to be able to fill in the blank spaces in a questionnaire is far too extravagant a luxury for the average petroleum engineer. And yet the refusal to be bothered with the taking of fundamental data may under certain circumstances prove to be an even more extravagant luxury. It is hoped that this paper will have served to indicate when and why engineering measurements should be made, so that the gathering of these data will deserve to become an accepted practice of the petroleum engineering profession.

MONEY-SAVING IDEAS

for EQUIPMENT BUILDERS

Nickel Cast Iron News
Published in the Interest of Producers and Users of Cast Iron
Orientals Make Good Use of Alloy Iron Castings
New Abrasion Service Records Made Available
Nickel Steel Topics
Screwdrivers Made to Withstand Rough Treatment
Nickel Steels Play Important Role in Machine Tools
"Bicycle Built for Two" (Speeds)

Two periodicals mailed FREE on request, cite actual cases

NICKEL STEEL TOPICS—This twelve page illustrated, miniature newspaper is published every second month and is devoted exclusively to Nickel alloy steels. Each issue is packed with illustrated technical and news articles dealing with the production, treatment and uses of these steels in rolled, forged and cast forms. Special features such as a question and answer page and pertinent editorials on technical subjects involving the uses of Nickel alloy steels are included in every issue.

NICKEL CAST IRON NEWS—This publication is a 12 page, illustrated newspaper-type periodical devoted to technical and news articles featuring the production of Nickel cast irons. Editorials and a question and answer section on these materials are special features in each issue. "Nickel Cast Iron News" alternates on a monthly basis with "Nickel Steel Topics".

NICKEL STEELS • CAST IRONS

AVAILABLE ON REQUEST—More Than 75 Publications Covering Various Industrial Fields, Applications and Production Procedures.

Permanently valuable for reference purposes are a large group of publications applying to various industrial applications and production procedures involving the uses of Nickel alloy steels, Nickel cast irons or Nickel containing non-ferrous materials. The titles of these publications with a brief description of their respective contents are set forth in a special catalogue, available on request. For your copy, simply return the coupon below.

The factual, informative material appearing in "Nickel Steel Topics" and "Nickel Cast Iron News" is of considerable practical value as evidenced by the fact that over 100,000 engineers, metallurgists and production men are now regularly reading these publications. You may read them too, at no cost or obligation. Simply mail the coupon at right.

I'D LIKE TO KEEP UP WITH THE NEWS

The International Nickel Company, Inc., 67 Wall St., New York, N. Y.

Gentlemen: Without cost or obligation, please send me the publications checked:

Nickel Steel Topics ☐ Nickel Cast Iron News ☐ List of Current Publications ☐

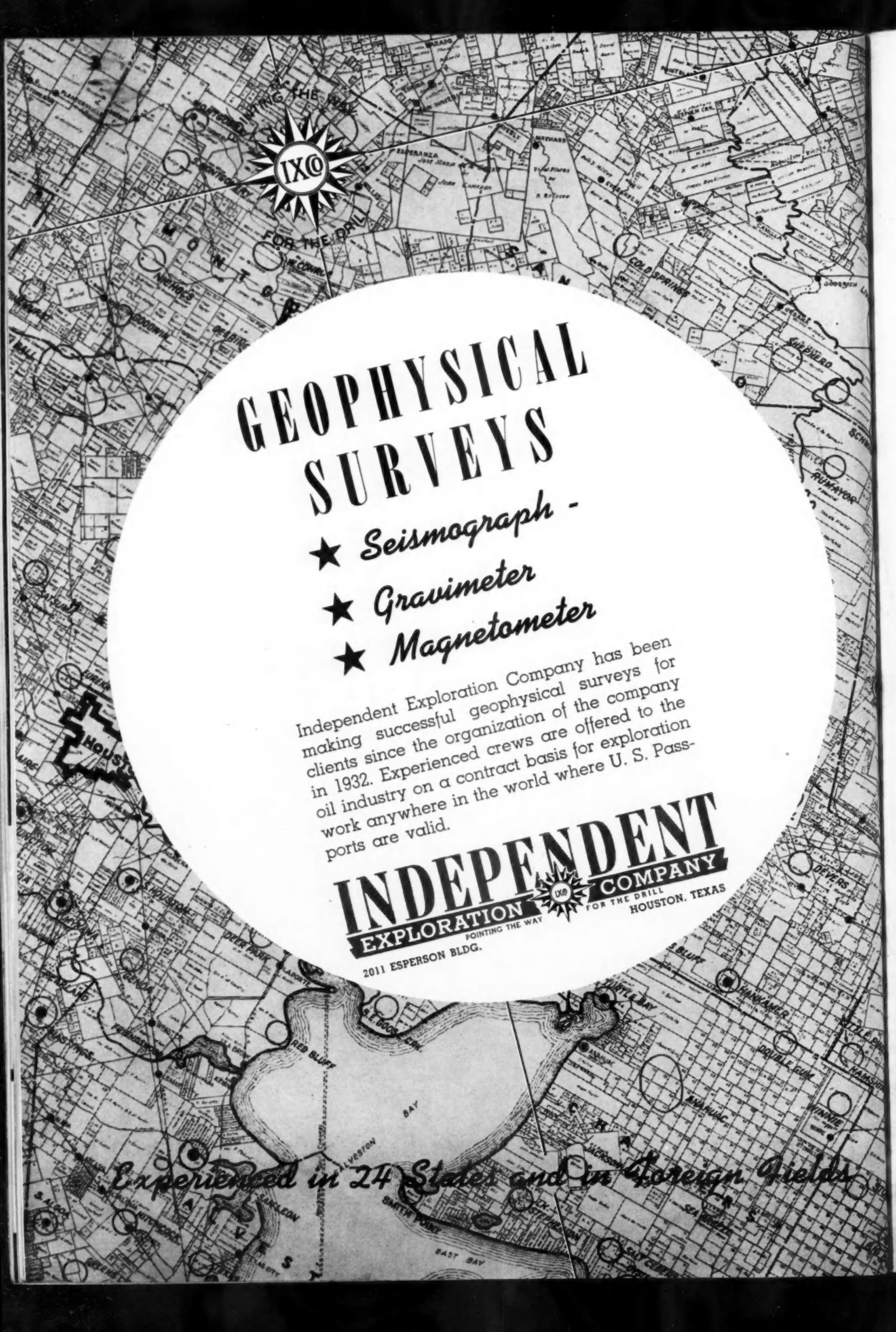
*Name*_____

O.W.-1-13-41

*Address*_____

*City*_____ *State*_____

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.



GEOPHYSICAL SURVEYS

★ *Seismograph -*

★ *Gravimeter*

★ *Magnetometer*

Independent Exploration Company has been making successful geophysical surveys for clients since the organization of the company in 1932. Experienced crews are offered to the oil industry on a contract basis for exploration work anywhere in the world where U. S. Passports are valid.

INDEPENDENT EXPLORATION COMPANY

POINTING THE WAY — FOR THE DRILL

HOUSTON, TEXAS

2011 ESPERSON BLDG.

HIGHLIGHTS IN THE WEEK'S NEWS

Washington

President Anticipates More Gasoline Tax Revenue

Collections from the federal gasoline tax will reach $389,200,000 during the 1942 fiscal year which begins July 1, next, at the present rate of 1½ cents per gallon, compared with $360,600,000 expected to be collected during the current fiscal year and $226,186,669 actually received, at the rate of 1 cent per gallon, during the fiscal year ended June 30, last, it was disclosed January 8 by President Roosevelt in his annual budget message to Congress.

Revenue from the tax on lubricating oil is expected to amount to $38,400,000 in 1942, compared with $37,400,000 this year and $31,232,589 actually collected last year, it was estimated, and transportation of oil by pipe line is expected to return $15,000,000, against $13,900,000 this year and $11,510,646 in 1940.

Federal royalties on oil, gas, etc., are exected to return $964,010, the same as is estimated for the current year, or slightly more than the $960,529 actually collected in 1940.

With total expenditures for the fiscal year 1942, excluding debt retirement, estimated at $17,485,528,000 as the minimum, President Roosevelt, in his budget message, called for additional taxes to finance part of the defense program, but warned against any tax policy which restricts general consumption and declared there are many ways in which our tax system can be improved without resort to restrictive levies.

"We cannot yet conceive the complete measure of extraordinary taxes which are necessary to pay off the cost of emergency defense and to aid in avoiding inflationary price rises which may occur when full capacity is approached," he said. "However, a start should be made this year to meet a larger percentage of defense payments from current tax receipts."

No Changes for Oil Department

While the budget throughout shows the results of the effort to reduce the non-military expenses of the government, no change is to be made in the fund of $255,000 allotted the petroleum conservation division of the Interior Department, or in the $260,000 fund for oil and gas investigations by the United States Bureau of Mines.

The work of the bureau is conducted under a half-dozen projects, and the budget allocates $84,435 for investigation of characteristics and behavior of rocks and fluids in oil- and gas-producing strata; $14,410 for increasing oil recovery, including methods applicable to partly depleted fields; $45,430 for engineering studies of petroleum and natural gas fields; $9,600 for studies of natural gas transmission; $78,685 for petroleum chemistry and refining, including studies of oil stocks, and $27,440 for miscellaneous studies, including disposal of oil-field wastes, salt in crude oil, corrosion of oil-field equipment, and the cleaning and pumping of oil wells.

No funds are to be provided for the protection of interests of the United States in matters affecting oil lands in the former naval reserves, for which $25,850 was made available this year. This fund was used in connection with the government's proceedings to reclaim Sections 16 and 36 in the Kettleman Hills field, which it is expected will be completed before the end of the current fiscal year.

The fund for operation and conservation of the Naval Petroleum Reserves is to be cut from $86,500 to $71,500, the reduction to be made in the amount paid the Interior Department for work it performs on the reserves, which are under the administration of the Navy Department.

Mann Renews Attack on Soldiers in State Jobs

Attorney General Gerald Mann has announced that he will appeal to the United States Supreme Court a decision of the Texas Supreme Court holding that a national guard officer on active duty could continue as a state official. So far as the oil industry is concerned, the appeal will be important, since it would determine the status of Railroad Commissioner Ernest O. Thompson, who is in Camp at Brownwood with a unit of the guard.

News Index

General:

Associations	47
Courts	43
Imports	45
Legislation	45
Pipe Lines	50
Washington	42
Mexico	50
Markets-Statistics	48
Men in News	65

U. S. Field Operations:

Arkansas	58
California	58
Completions	59
East Texas	53
Forest City Basin	53
Illinois	51
Indiana	51
Kansas	52
Kentucky	51
Louisiana Coast	56
Michigan	58
Mississippi	57
North Louisiana	57
North Texas	55
Oklahoma	52
Rocky Mountains	58
Southeastern States	57
Southwest Texas	55
Texas Gulf Coast	56
West Texas	54
Wildcat Development	63

Courts

Indicate Possible Consent Decree in Trust Suit

Possibilities of a consent-decree settlement of the suit filed against 22 major oil companies, their subsidiaries and affiliates and the American Petroleum Institute on September 30 last, were raised last week in reports that representatives of the companies were forming a committee to confer with officials of the Department of Justice.

Department officials said that as yet they had had no conferences with the oil group but that, as usual in such cases, the doors of the department were open.

Settlement of the case by consent decree, it was said, would save both the government and the companies time and money, but it was emphasized that no settlement could be reached unless the government was conceded "substantially" all it asked for in its bill of complaint.

A very large proportion of the anti-trust suits brought by the government are settled by consent decrees. Such a settlement was approved by the New York District Court January 7 in a case brought against the electrical equipment industry, and similar action was taken last year in a broad suit against the major motion picture companies.

United States High Court Approves Texas Proration

Giving blanket approval to the policy and formula adopted by the Texas Railroad Commission, the United States Supreme Court on January 6 ordered vacated injunctions granted Rowan & Nichols Oil Company and Humble Oil & Refining Company by the Federal Court for the Western District of Texas, restraining enforcement of proration orders challenged as discriminatory.

The court's action was taken by a 6-to-3 vote, with Chief Justice Hughes and Associate Justices McReynolds and Roberts, who last year disagreed with a majority ruling upholding the commission in another case brought by the Rowan & Nichols Oil Company, dissenting.

Delivering the opinion for the court, Associate Justice Felix Frankfurter declared that the challenged order of the commission "concededly" satisfies all procedural requirements, and was "part of a continuous process of administrative responsibility, preceded by a specific hearing affecting the immediate situation, with full opportunity given to the oil company to develop the facts and arguments which it later renewed."

Only one decision was rendered, dealing with the issue as presented by Rowan & Nichols Oil Company, which was, however, applied to both cases, it being pointed out that the only variations in the facts are minor and not of

sufficient moment to call for particularization in a decision in the Humble case.

Dealing with the issue submitted, Justice Frankfurter pointed out that so far as relief in the federal courts is concerned, it was held in the case decided last year that the commission's order was without infirmity.

"Thorny Problem"

The adjustment of production between wells at that time was called "as thorny a problem as has challenged the ingenuity and wisdom of legislatures." At that time it was claimed that an hourly potential formula fatally omitted other relevant factors, especially acre-feet of sand, and that the minimum allowance of 20 barrels, which nearly absorbed the total production, constituted an illegitimate discrimination against high-producing and thinly drilled areas.

"We rejected these arguments as an attempt to substitute a judicial judgment for the expert process invented by the field in a state so peculiarly dependent on specialized judgment," Justice Frankfurter recalled. "We said in effect that the basis of present knowledge touching proration was so uncertain and developing, that sounder foundations are only to be achieved through the fruitful empiricism of a continuous administrative process. Further, that ought not to be stifled by drawing from the generalities of the Constitution allegiance to one as against another speculative assumption even though delusively clothed in formal findings of fact."

In the order now before the court, he explained, the commission allowed a total production of 691,000 barrels and the formula of allocation took into consideration bottom-hole pressure and the quality of the surrounding sand of the wells, as well as hourly potential. Under the first order, the Rowan & Nichols Oil Company lease was allowed an output of 154 barrels a day or 0.029 percent of the total allowable; under the later order it may produce 260 barrels a day, or 0.037 percent of the total.

"This comparison of the practical operation of the two orders exposes the emptiness of the claim that a constitutional line can be drawn between them," the court declared.

"The accommodation of conflicting private interests in the East Texas oil field, with due regard to the public welfare, is beset with perplexities, both geological and economic," it continued.

Water Drive

"As we read the records in these cases, this picture emerges. The huge oil resources of that region, viewed in cross-section from east to west, are roughly triangular in shape. On the lower western side the pressure of an oil-water face furnishes the principal energy of the field. As the oil is withdrawn, the pressure is decreased. The drive of the water from the west forces the oil eastward, and the westernmost wells are first exhausted. The reduced pressure in the field shortens the life of the wells on the extreme eastern edge, with the result that the wells nearer the center of the field, like those of the Rowan & Nichols Company, are likely to be most long-lived.

"Thus it is that a production formula dependent on current reserves of oil in place—a consideration which greatly influenced the court below and was urged before us—contains elements of unfairness to wells on the edge of the field by disregarding the migration of oil from west to east. Other factors further complicate the situation. The surface is often divided into small tracts, and the commission, acting under the authority of the Texas statutes, has permitted the drilling of wells by small owners in order to prevent practical forfeiture of their interests. Small producers have investments in existing wells with low capacities, and these wells need a minimum daily production to justify their enterprise. In addition to all this, any scheme of proration duly mindful of all those considerations, hardly mathematically commensurable, which constitute the total well-being of a society, must assure the continued operation of a sufficient number of wells for an adequate exploitation of the state's oil resources."

In achieving a reconciliation of these "tangled and partly conflicting aims," it was pointed out, the commission evidently regarded the 20-barrels minimum allowance as a guiding factor, on the conviction that the minimum allowance accelerates the rate of production of the densely drilled areas on the edges of the field most subject to losses from the migration of the oil, that such allowance is an appropriate incentive to the drilling of small tracts, and that thereby investment losses in low-producing wells are minimized.

Expert Conclusions

"Nothing in the Constitution warrants a rejection of these expert conclusions," Justice Frankfurter maintained. "Nor, on the basis of intrinsic skills and equipment, are the federal courts qualified to set their independent judgment on such matters against that of the chosen state authorities. For its own good reasons Texas vested authority over these difficult and delicate problems in its railroad commission. Presumably that body, as the permanent representative of the state's regulatory relation to the oil industry equipped to deal with its ever-changing aspects, possesses an insight and aptitude which can hardly be matched by judges who are called upon to intervene at fitful intervals.

"Indeed, we are asked to sustain the district court's decree as though it derived from an ordinary litigation that had its origin in that court, and as though Texas had not an expert commission which already had canvassed and determined the very issues on which the court formed its own judgment. For it appears that the court below nullified the commission's action without even having the record of the commission before it. When we consider the limiting conditions of litigation—the adaptability of the judicial process only to issues definitely circumscribed and susceptible of being judged by the techniques and criteria within the special competence of lawyers—it is clear that the Due Process Clause does not require the feel of the expert to be supplanted by an independent view of judges on the conflicting testimony and prophesies and impressions of expert witnesses.

"The record gives little justification for confidence in such testimony as the basis for judicial dogmatism," the opinion commented, citing one expert testifying for the company whose estimate changed 1,000,000,000 barrels in the year between the two cases.

"Similarly, in regard to the crucial issue of the 20-barrel minimum," it continued, "although it was common ground that some minimum was essential to avoid fatal losses of investment, what that minimum should be was clearly not shown to be capable of mathematical ascertainment, and no expert on behalf of the oil company proved that the minimum of the commission bore no relation to the legislative policy to be enforced by the commission.

"The Constitution does not provide that the federal courts shall strike a balance between ascertainable facts and dubious inferences underlying such a complicated and elusive situation as is presented by the Texas oil fields in order to substitute the court's wisdom for that of the legislative body," Justice Frankfurter concluded. "The real answer to any claims of inequity or to any need of adjustment to shifting circumstances is the continuing supervisory power of the expert commission. In any event, a state's interest in the conservation and exploitation of a primary natural resource is not to be achieved through assumption by the federal courts of powers plainly outside their province and no loss plainly beyond their special competence. The Fourteenth Amendment was not intended for such ends.

"The court below also erred in holding the order a violation of the Texas statute requiring proration on a 'reasonable basis.'"

Near Final Settlement Of Madison Trust Cases

The federal court's calendar at Madison may be cleared of the oil anti-trust suits without further trials, it became apparent last week as additional pleas of nolo contendere were filed, or prepared for filing by defendant companies and individuals.

At Danville, Illinois, Federal Judge Walter C. Lindley, to whom the cases were assigned following a lengthy trial of the first case by Federal Judge Patrick T. Stone in 1937-38, accepted a nolo contendere plea by The Texas Company and H. W. Dodge, company vice president, assessing fines of $14,000 and $1,000, respectively.

Tide Water Associated Oil Company, defendant in a case scheduled for trial January 20, asked dismissal of the indictment, contending a similar action against it in the government's suit against the Standard Oil Company (Indiana), dismissed by Judge Stone, would place it in double jeopardy. It was indicated in Washington that settlement would be effected before trial date.

A group of defendants granted new trials by Judge Stone in 1938 may enter similar pleas, in view of a United States Supreme Court decision upholding conviction of the original group.

Meanwhile, Judge Stone granted motions for a bill of particulars sought by oil companies convicted in 1938 and now involved in 12 civil damage suits. Twelve jobbers and consumers are seeking treble damages, totaling about $2,250,000, under the Clayton anti-trust act.

The court held the defendant companies are entitled to know where the plaintiff companies do business and from whom they purchased their gasoline. He also granted a motion for security of costs from non-resident suitors, but denied a defendant's motion to strike that portion of the identical complaints that refer to conviction of the companies and the United States Supreme Court judgment upholding their conviction.

Legislation

Work Starts on National And Several State Fronts

Reintroduction of a number of oil measures which were pending last year marked the opening of the Seventy-Seventh Congress, the most important from the standpoint of an industry which the Department of Justice plans eventually to disintegrate being three bills introduced in the Senate by Senator Guy M. Gillette and in the House by Representative Vincent F. Harrington, both of Iowa, calling, respectively, for the divorce of marketing, divorce of pipe lines, and divorce of tanker and barge operations from other branches of the industry.

On the state front, Oklahoma's Governor Leon C. Phillips called upon his legislature for renewal of the Interstate Oil Compact, asked that the gross-production tax be relevied at its present 5-percent rate, and called for exemption of fuel used for manufacturing purposes from the state's sales tax to encourage industrial development. Sentiment in Illinois, as the legislature began its work, seemed to increase for a conservation statute, and even more for a gross-production tax. The campaign for a new oil-and-gas-conservation commission grew more active in Texas.

The pipe line and marketing divorce bills introduced at Washington were sponsored by the two Iowa members last session, but the tanker-barge bill is new, although along the same lines.

Joint resolutions to declare the policy of the United States with regard to tidal and submerged lands were introduced by Representatives Homer D. Angell of Oregon and Lee E. Geyer of California, while Representative Hatton W. Sumners of Texas reintroduced his bill providing an embargo against importation into the United States of property confiscated in any foreign country without payment of just compensation to the owners.

Bills providing for sales taxes on fuel oil, for the benefit of the coal industry, were reintroduced by Representatives Patrick J. Boland and J. Harold Flannery of Pennsylvania. The Spence pollution bill was reintroduced by Representative Brent Spence, of Kentucky.

Representative Wright Patman of Texas introduced his chain-store tax bill, this year eliminating the exemption of filling stations, and Representative Rudolph G. Tenerowicz of Michigan submitted a bill requiring the blending of alcohol with gasoline.

State Sabotage Prevention

A bill designed for sabotage prevention, drafted by state officials who attended a Federal-State Conference on Law Enforcement Problems in National Defense, held in Washington, will be introduced in most legislatures this year.

The measure seeks to do five things: provide for punishment of acts of sabotage already committed; facilitate detection of saboteurs entering unlawfully upon properties essential to national defense by providing for their questioning and detention; make it more difficult to destroy properties essential to defense by regulating use of highways abutting such properties; aid in conviction of saboteurs by changes in the law of attempts, solicitation, conspiracy and the privilege against self-incrimination, and guard against the act being taken as a means of oppressing organized labor. Wording of the latter section is taken from the National Labor Relations Act.

Phillips' Message

Phillips, declaring the compact "has furnished a satisfactory forum to study joint problems and to cooperate in state conservation of oil and gas," asked renewal and extension of the compact, which expires September 1, with provision that succeeding governors may become members by proclamation.

"The states have demonstrated that they can, by joint cooperative action, conserve their natural resources," Phillips told the Oklahoma legislature.

"I recommend the relevying of the gross production tax at the same rate, for the reason I believe that, in the highly competitive market which Oklahoma producers now face, this tax is as high as we can safely make it without further curtailing the revenue so badly needed in the general revenue fund from that source," Phillips said. "The decrease in income from the gross production tax is in excess of $4,000,000 a year. This decrease was caused by the shift of markets from Oklahoma to other states."

Discussing the state sales tax, which he asked be reinacted at 2 percent, he said:

"However, since cheap fuel is one of the inducements which may reasonably be calculated to invite industry to our state, I believe that fuel used within the state for manufacture should not be subjected to this tax. We need manufacturing industries and their pay rolls far more than we need the small amount of revenue this one exemption would cost."

The week saw introduction of a House bill calling for an increase in Oklahoma's gross production tax from 5 to 7 percent, while a Senate bill authorized extension of the compact another two years.

Illinois Sentiment Growing

While more Illinois legislators have expressed themselves in favor of regulation than have stated definite opposition, a group large enough to decide the issue had not made up their mind by the end of last week. It was generally felt that a legislative study should be made of the question, and others said the state should proceed with caution so that action would not be taken that would handicap Illinois producers in their competition with other states.

Sentiment for a gross production tax, however, was much more marked as legislators searched for additional revenue for relief and old age pensions. Suggested rates ranged from 5 to 10 percent.

Oil and gas operators interested in obtaining a separate oil and gas conservation commission met in Dallas January 10 to perfect plans for the campaign to be pushed in the legislature, which convenes January 13.

"Our purpose is to obtain an appointive conservation commission to get the oil and gas business out of politics," said Clint C. Small, Austin, former state senator and spokesman for the group.

The proposed bill will call for appointment by the governor of three commissioners, initially with two-, four- and six-year terms, each to receive an annual salary of $12,000. None would be eligible for appointment who is not a licensed petroleum engineer or has not had at least ten years' experience in producing oil and gas. New appointments would be for six-year terms. A member of the commission would not be eligible for any other office within six months after he retires from the commission, and if he becomes a candidate for a different office he would automatically vacate his place on the commission.

While Governor W. Lee O'Daniel had not expressed himself on the question up to late last week, it is considered he may favor a move which would give him the power of naming a new important state body. Texas Railroad Commissioners Ernest O. Thompson and Jerry Sadler unsuccessfully opposed O'Daniel's re-election last summer, and later Thompson was removed as the governor's representative on the Interstate Oil Compact Commission.

In some quarters, it is believed that election of Olin Culberson to the Texas Railroad Commission may have allayed somewhat demands for a separate oil and gas commission. Culberson has had considerable experience as a former member of the commission's staff.

Imports

Letter, Buttram to Wiess, Scores Import Position

Continuing the exchange of letters between Frank Buttram, president of the Independent Petroleum Association of America and H. C. Wiess, president of Humble Oil & Refining Company with reference to recent increases in imports of foreign oil (See THE OIL WEEKLY, 12-23-40, p. 48 and 12-30-40, p. 45) we present the latest communication from Buttram to Humble's president.

"Your letter of December 14 was greatly appreciated and I was much interested in your statements with regard to the import situation. At a time when the entire industry is being attacked from the outside, it is most important that we all discuss frankly our problems in the hope that the industry can present a united front against such attacks.

"In commenting on your letter I would like to discuss first some points which you raise bearing on the general subject. You stated that: 'Our interest in the import matter is the same as yours. The Humble Company is primarily a producing company and imports no crude or products.'

"It would seem to be apparent that the interest of the Humble Company in the matter of imports is distinctly different from the interest of the independent producer. The Humble Company is, of course, a subsidiary of the Standard Oil Company (N. J.) through ownership by the latter of 72 percent of the stock of the Humble Company. The operations of the Humble Company are included in the consolidated financial statement of the Standard Oil Company (N. J.) and the Humble Company is reported to be the principal source of

revenue for the Standard Oil Company (N. J.). Other subsidiaries of the Standard Oil Company (N. J.) control its foreign operations and importation of foreign oil into the United States. The largest part of the Humble's output of petroleum goes into the same Eastern markets of the United States as do the imports of the Standard's other subsidiaries. The subsidiaries controlling foreign production and imports are reported to be, next to Humble, the most important source of revenue for Standard. Obviously, the Humble and the subsidiaries that import foreign oil cannot work at cross purposes. It is inconceivable that 'the left hand does not know what the right hand is doing' in a large and successful company such as the Standard Oil Company. The independent producer has no 'brother' who is bringing foreign oil into the same markets that he is serving.

Market Outlets

"Another important distinction arises from the fact that the Humble Company, along with the Standard and other of its subsidiaries, is one of the largest purchasers of crude oil whereas the independent producer usually purchases no oil. As a purchaser, the Humble is interested in a buyer's market for crude while the independent producer is interested in a seller's market. Price does not affect the production owned by Humble until it is sold whether that sale is through the filling station or to an affiliated company. With regard to this difference between a buyer's and a seller's market, it might be pertinent to inquire whether Humble is satisfied with the condition of its markets at the filling station. Your Company also has a market outlet through a parent company of which it is the principal subsidiary. This parent company naturally is interested in your welfare. The independent has no such connection. I recognize, of course, the domestic nature of the Humble Company's operations but I sincerely believe that the above-mentioned relationships are an important distinction between that company and the independent producer.

"An additional distinction is found in the fact that the independent producers consider the import situation from an overall standpoint and are not interested in particular companies or particular foreign countries. You have distinguished between Mexican imports and other imports condemning the former. Your company is the principal subsidiary of a company importing Venezuelan oil. It should be pointed out that the importers of Mexican oil have argued in favor of these shipments and complained against the increases in Venezuelan imports. The independent producer has no wish to become involved in any argument between companies or between countries. With regard to the importation of Mexican oil, I agree wholeheartedly that these imports have a harmful effect upon our domestic situation both for the reason that you have stated—the high gasoline content of these imports—and, more important, because of the unfair competitive advantage gained by the importers of this oil and the resultant harm done to the domestic producers.

"I find it impossible to agree, however, with your conclusion that the Venezuelan Trade Agreement has not been responsible for the large increase in imports from Mexico. While it is true that the quota for Mexican shipments at the reduced tax rate was exhausted early in 1940, there is serious doubt as to whether the amount of the tax has been the governing factor. As you know, the excise taxes on imports were inadequate to equalize the cost of domestic and foreign production even before they were reduced under the Venezuelan agreement. The competitive advantage held by importers was merely increased by the reduction in the taxes. It seems to me that the factor which really affected the quantity of imports was the control held by Congress over the situation through periodic review of the import taxes. The actual amount of the tax acted as a partial protection for the domestic industry but only as a slight deterrent to the importers. The Congressional review and the control of Congress over imports has been removed, of course, by the Venezuelan agreement. This registers a complete change of attitude on the part of the federal government which previously discouraged imports of foreign oil but now offers definite encouragement to increased shipments from foreign countries. This must be considered, I believe, in analyzing the import situation.

"With regard to the question of importation of residual fuel oil, you state that the increase in these imports has not had any serious adverse effect upon our domestic situation and may have been beneficial. In effect, this statement indicates that your opinion is that this nation is unable to an increasing extent to supply the demands for this product economically. I hesitate to devote too much space here to answering this argument as our association has already presented its position on this matter in considerable detail. I am taking the liberty of enclosing a copy of our brief to the Committee on Reciprocity Information and call your attention particularly to pages 12 to 22 which discuss the subject in more detail than I feel should be included in this letter. On these pages facts are presented showing the ample supply in this country of heavy oil of a quality similar to the imported oil. In California alone there is a supply readily available in above-ground storage and in potential production more than sufficient to meet the demand. A large part of this supply is held by independent producers in California. Why should foreign oil be preferred to domestic production?

Control of Tankers

"I cannot subscribe to the theory which divides the states and imposes penalties on some. I believe that the domestic industry should be considered as one united group with common problems that must be worked out to the best interests of all. In connection with the large supplies of heavy oil in California, the situation might be very different if the control of tankers was in the hands of those concerned with the welfare of that state rather than those interested in increasing imports of foreign oil. Other aspects of the question of satisfying the demand from domestic oil are discussed in the attached brief which shows conclusively, I believe, that we do not need increased petroleum imports.

"In addition to the facts presented in the enclosed brief, there are some additional aspects of the residual fuel situation that should be discussed. You have called attention to the marked increase in residual fuel imports. It appears that for the year 1940 these imports will be equivalent to 11 percent of the total demand for this product as compared with 6.4 percent for the year 1939. This represents an increase of approximately 13,000,000 barrels in imports of residual fuel over last year which is about equal to the increase in total demand for this product in the area east of California. Stocks of residual fuel in this same area have increased about 2,500,000 barrels during 1940 as compared with a decrease of slightly less than 6,000,000 barrels during 1939.

Refinery Yield

"Furthermore, there is a most important angle which I believe should be considered. The refinery yield of residual fuel from crude oil in the area east of California during 1940 has been slightly below the yield during 1939 despite the increased demand and the large stocks of gasoline. The importance of this yield factor is apparent when we consider that a yield equal to that obtained at the beginning of 1940 would, if continued through the year, have resulted in an additional 21,000,000 barrels of residual fuel. As noted above, imports increased 13,000,000 barrels, however resulting in a smaller proportion of the market for the domestic producer.

"The industry has had one year to test the theory that increased imports are necessary and beneficial. What have been the results? They certainly do not prove that the industry has been helped. Under that theory, one of the principal benefits supposed to be gained was an an improvement in the gasoline situation. Gasoline stocks increased almost 3,000,000 barrels east of California during the year. Meanwhile gasoline prices dropped steadily. In only nine months in the entire history of the industry have gasoline prices reached the low level to which they fell during 1940. You have referred to the fact that residual fuel prices have been uniformly higher in 1940 than during 1939. While this is true, you did not mention that these prices have weakened steadily throughout 1940 in contrast to increasing prices during the previous year. This has been true both in the New York and Gulf Coast markets. The Gulf Coast market during the last three months has been substantially below 1939. This obviously is harmful to the domestic industry particularly when it occurs in the case of a product such as residual fuel oil which sells below the cost of the raw material and which, in the opinion of some, may be entering into uneconomic competition with other fuels in some instances. While all the unsatisfactory developments during the past year obviously should not be attributed to the large increase in imports, it is equally true that little or no factual evidence can be found that could be used in support of the theory that these imports are beneficial.

"In conclusion I feel compelled to say that I was disappointed to find that you seem to adopt the same attitude toward imports that is held by importing companies and accepted by some officials in the federal government. This attitude is reflected in arguments which have been presented by government officials as a justification for the Venezuelan trade agreement."

Associations

America Must State War Aims, Oil Men Told

While the American people may feel no good and sufficient reason for getting into the present European conflict, "no isolationist has come forward with any picture which can grip our imaginations of how wonderful and beautiful and lovely we can make our life if we stay out of war," Henry R. Luce, chairman of Time, Inc., publishers of Time, Life and Fortune magazines, told the annual membership meeting of the Kansas-Oklahoma Division, Mid-Continent Oil & Gas Association, in Tulsa, January 11.

"America and America alone can and must state the war aims," Luce said. "Unless such aims are stated clearly, bluntly, and unequivocally, then we shall greatly increase the already hazardous chances of world-wide disaster and destitution in the coming decade and decades."

Germany, Luce said, has no war aims except to take all she can get. Great Britain, while she may from time to time announce war aims, cannot win the war without American help.

"On the contrary, if America were to announce war aims, Great Britain would almost certainly accept them," Luce added. "And the entire world, including Adolph Hitler, would accept them as the gauge of this battle.

"Of course, it may be that the American people will prefer to default on the whole matter—will prefer to let Great Britain struggle with the perplexing problems of this globe, leaving America free to sit in moral judgment of Great Britain and get sore when Britain's stupidities or immoralities get us into trouble," Luce continued. "But actually we no longer can escape the burden of our destiny. From now on we have nobody but ourselves to blame. Ours is the power, ours is the opportunity—and ours will be the responsibility—whether we like it or not.

Round-Table Discussion

A round-table discussion covering production, transportation, refining and distribution of petroleum and its products was another feature of the meeting. With William R. Steven, managing editor of The Tulsa Tribune as moderator, participants were George A. Hill, Jr., vice president for production of the American Petroleum Institute and president of Houston Oil Company of Texas, Houston; Dr. Gustav Egloff, director of research for Universal Oil Products Company, Chicago; Baird H. Markham, director of the American Petroleum Industries Committee, New York, and Chester H. Gray, director of the National Highway Users Conference, Washington.

Luce described the present as "a century of most magnificent promise.

"In no century have there been such tremendous possibilities for the progress and happiness of man," he said. "And in no one century have so many men, women and children suffered such pain, anguish and bitter death."

An awareness of three propositions must be included in a true conception of our world, the speaker added. Our world, for the first time in history, is fundamentally indivisible, it is capable of producing all the material needs of the entire human family.

"No one man can create this vision," Luce said. "The vision will come if it comes at all, out of the imaginations of many men. You and I, as practical men, will have a hand in it. Let us give ourselves wholly and unstintingly to this task, to strive with all strength to apprehend and to fashion a vision of a dynamic America as a world power in the Twentieth Century.

"It is for America and for America alone to determine whether a system of free or relatively free economic enterprise shall or shall not prevail in this century. We know perfectly well that there is not the slightest chance of anything faintly resembling a free economic system prevailing in this country if it prevails nowhere else. What then does America have to decide? It is very simple, we have to decide whether or not we shall have for ourselves and our friends, freedom of the seas, the right to go with our ships and our airplanes where we wish, when we wish and as we wish. The vision of America as the principal guarantor of the freedom of the seas, the vision of America as the dynamic leader of world trade has within it the possibilities of such enormous human progress as to stagger the imagination. Let us not be staggered by it. Let us rise to its tremendous possibilities.

"World's Breadbasket"

"Closely akin to the purely economic area and yet quite different from it, there is the picture of an America which will send out through the world its technical and artistic skills. Engineers, scientists, doctors, movie men, makers of entertainment, developers of airlines, builders of roads, teachers, educators. Throughout the world, these skills, this training, this leadership is needed and will be eagerly welcomed, if only we have the imagination to see it and the sincerity and good will to create the world of the Twentieth Century.

"But now there is a third thing which our vision must immediately be concerned with. We must undertake now to be the Good Samaritan of the entire world. I believe that it is the manifest duty of this country to undertake to feed all the hungry people of the world or as many of them as we can from time to time reach consistently. And maintain a very tough attitude toward all hostile governments.

"For every dollar we spend on armaments, I believe we should spend at lease a dime in a gigantic effort to feed the world, and all the world should know that we have dedicated ourselves to this task. I believe that every farmer in America should be encouraged to produce all the crops he can, and that all that we cannot eat should forthwith be dispatched to the four quarters of the globe as a free gift, administered by a humanitarian army of Americans, to every man, woman and child on this earth who is really hungry.

"The vision of America as a world power includes the stimulation of the kind of free and dynamic economy we like throughout the world or throughout large parts of it. It includes sending our brains and craftsmanship to all peoples who need them and want them. It inculdes plain, simple generosity," he added.

C. C. Herndon, vice president and counsel for Skelly Oil Company, was master of ceremonies and presided over the program.

Ralph O. Ditler, Stanolind Oil Purchasing Company, and J. F. McMannon, National Bank of Tulsa, were general chairman and vice chairman, respectively, of the arrangements committee.

The program committee consisted of the following: Steven, chairman; L. F. McCollum, vice chairman, The Carter Oil Company; George Bowen, Sun Oil Company; Y. P. Broome, Tide Water Associated Oil Company; Don Emery, Phillips Petroleum Company; J. Burr Gibbons, Gibbons Advertising Agency; George A. Manahan, Manahan Oil Company; J. D. McNutt, The Pure Oil Company; L. C. Ritts, Devonian Oil Company; Hugh M. Stalcup, Skelly Oil Company; W. R. Wallace, Magnolia Petroleum Company, and W. K. Whiteford, The British American Oil Producing Company.

Finance committee consisted of P. H. Bohart, chairman, Gulf Oil Corporation; A. L. West, vice chairman, Continental Oil Company; Roscoe Adams, The First National Bank & Trust Company; Don Bothwell, Darby Petroleum Corporation; W. M. Bovaird, Bovaird Supply Company; E. F. Bullard, Stanolind Oil & Gas Company; R. K. Huey, Deep Rock Oil Corporation; R. W. McDowell, Mid-Continental Petroleum Corporation, and Ralph B. Roark, Shell Oil Company.

Invitations committee was composed of R. Otis McClintock, chairman, The First National Bank & Trust Company; James E. Allison, vice chairman, Hanlon-Buchanan, Inc.; G. D. Almen, Winona Oil Company; F. B. Carden, Homestake Royalty Corporation; N. G. Henthorne, Tulsa Daily World; C. L. McMahon, C. L. McMahon, Inc.; H. N. Pardee, The Texas Company; J. L. Shakely, Frick-Reid Supply Corporation; D. R. Snow, Barnsdall Oil Company; J. B. Steele, Kewanee Oil Company; G. A. Tompson, Bethlehem Supply Company; and William B. Way, International Petroleum Exposition.

Members of the hall and decorations committee were Way, chairman; R. C. Walker, vice chairman, Southwestern Engraving Company; Phil J. Cannon, The Tulsa Club; William C. Gillespie, KTUL; J. E. Holm, The Atlantic Refining Company; Frank B. Long, Oklahoma Natural Gas Company; C. H. Pape, Selby Oil & Gas Company; E. E. Robbins, Oil Well Supply Company, and H. F. Stover, Gaso Pump & Burner Manufacturing Company.

The host committee included Dana H. Kelsey, chairman, Sinclair Prairie Oil Company; E. H. Moore, vice chairman, E. H. Moore, Inc.; J. Steve Anderson, Anderson-Prichard Oil Corporation; C. E. Beecher, Cities Service Oil Company; Guy T. Berry, Big Brother Oil Company; A. D. Cochran, Oklahoma Oil Corporation; C. L. Henderson, The Vickers Petroleum Company; A. V. Hoenig, Indian Territory Illuminating Oil Company; T. C. Johnson; John H. Kane; R. Otis McClintock, The First National Bank & Trust Company; William T. Payne, Big Chief Drilling Company; Earle S. Porter, Amerada Petroleum Corporation; Frank M. Porter, Wirt Franklin Petroleum Corporation; H. G. Ross, The Ohio Oil Company; Clay Tallman; H. F. Wilcox, H. F. Wilcox Oil and Gas Company, and C. H. Wright, Sunray Oil Company.

Gasoline Stocks Grow; Heavy Fuel Taken From Storage

Recent weeks have brought realization of the trouble that has been foreseen as regards holding down gasoline stocks while producing enough heavy fuel oil.

Refinery runs of crude were further increased in the week ended January 4, apparently in order to provide more heavy fuel oil; but the demand for that product still was not fully met from current production, and about 170,000 barrels came out of storage.

Along with larger refinery output of the heavy fuel oils went increased production of gasoline and light fuel oils, and both of those products backed up in the storage tanks—gasoline by a comparatively large amount.

The stepping up of refinery throughput in conjunction with temporary curtailment of crude production probably resulted in a further withdrawal of crude from storage, following a million-barrel draft in the previous week.

Runs to stills averaged 3,600,000 barrels daily in the week ended January 4, the American Petroleum Institute reported. That compared with an average of 3,585,000 barrels that was maintained in the two preceding weeks and was 5 percent above the average of 3,427,000 barrels for January of 1940.

Production of gasoline amounted to 11,960,000 barrels in the week of January 4. That was 73,000 barrels more than output in the previous week, an increase of about 10,000 barrels in the daily average. The new rate of production was almost 100,000 barrels in excess of the daily average for January a year ago.

Stocks of finished and unfinished gasoline jumped 1,779,000 barrels, an increase that was nearly the same as that in the corresponding week last winter, when the inventory was becoming seriously excessive. At the new level of 85,053,000 barrels, the gasoline stocks were approximately a million barrels larger than a year before.

Light fuel oils went into storage to the extent of 137,000 barrels, and the 42,403,000 barrels on hand January 4 compared with 32,782,000 barrels in storage a year previously. The industry remains, therefore, in a comfortable position as regards stocks of light fuels, despite the materially increased demand for that product.

Stocks of heavy fuel oils were reduced 172,000 barrels to 102,448,000, and the latter amount was about 3,000,000 barrels smaller than the inventory on hand a year previously, whereas demand currently is up materially because of the high rates of industrial and commercial activity.

Crude oil production in the United States averaged 3,367,200 barrels daily in the week of January 4, as Texas for the second consecutive week held fields shut in for three days instead of the usual two.

Stocks of crude oil dropped from 262,488,000 barrels on December 21 to 261,552,000 barrels on December 28, the Bureau of Mines reported. Although substantially larger than a year ago, the crude stocks are not considered much, if any, too large.

Fuel Oil Prices Advance; Gasoline Is Unchanged

Former market trends have been extended in the past 10 days, prices of heavy and light fuel oils, diesel oil, and kerosene having further advanced, while the gasoline market has remained somewhat unsteady, with prices unchanged. The markets for light crude oils, in reflection of the gasoline situation, have also continued unstable, as evidenced by the fact that several purchasers in the Corpus Christi district of South Texas last week followed the previously taken action of other buyers in grouping all high-gravity crudes under the same price as 28-28.9-gravity crude, a revision involving reductions of 2 to 24 cents, depending on the gravity of the oil.

The markets for heavy fuel oils are reflecting the fact that stocks of that product are comparatively small, in relation to the present and prospective demand. Storage was further reduced in the week ended January 4, despite increased production at the refineries. At Oklahoma refineries, No. 6 fuel oil was quoted last week at 65 cents a barrel, as compared with 60 cents previously. At New York harbor, the lowest price generally quoted for bunker oil was $1.25 a barrel, compared with $1.15 before, and the heavy oils were up from 10 to 15 cents a barrel all along the middle Atlantic coast.

Kerosene was quoted ⅛-cent a gallon higher in the Middle Western marketing region, as some refiners in the area and in the Mid-Continent advanced their prices by that amount.

Range oil, too, was marked up ⅛ to ¼-cent a gallon in the Oklahoma-Kansas and Middle Western refining districts.

The lighter fuel oils were in most instances unchanged in price.

On the Pacific Coast, diesel oil was quoted higher, some sellers having raised their minimum quotations to $1.20 a barrel from $1.15.

Lubricants remained generally unchanged in price, despite the recent improvement in the market. The present prices reflect to some extent the recent increases in postings of Pennsylvania grade crudes.

About one-half of the crude oil that is being produced in the Corpus Christi district of South Texas now is purchased under the reduced price postings adopted within the past few months by four buyers, namely, Republic Oil Refining Company, Amsco Pipe Line Company, Barnsdall Oil Company and Continental Oil Company.

Arkansas Fuel Oil Company January 7 announced that it would pay 95 cents a barrel for all grades of crude from the Urania, North Louisiana, field, retroactive

Trends of Operations and Changes in Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1938:						
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,687,000	32,068,000	118,711,000
1939:						
April 22	3,526,700	3,280,000	277,156,000	[2]87,769,000	21,085,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 26	[5]1,690,800	3,475,000	246,982,000	73,475,000	37,722,000	116,237,000
September 30	3,658,200	3,560,000	233,023,000	71,168,000	38,081,000	115,466,000
October 7	3,435,850	3,505,000	231,564,000	[6]71,152,000	38,549,000	114,397,000
October 21	3,771,550	[2]3,650,000	[3]229,127,000	72,122,000	39,358,000	115,060,000
October 28	3,498,500	3,520,000	230,453,000	72,660,000	39,562,000	114,786,000
November 25	3,818,100	3,510,000	231,811,000	75,595,000	38,527,000	112,106,000
December 30	3,545,000	3,445,000	237,742,000	80,985,000	34,184,000	106,680,000
1940:						
January 27	3,611,600	3,470,000	237,339,000	87,914,000	27,407,000	103,015,000
February 24	3,732,100	3,490,000	240,836,000	96,719,000	25,390,000	103,419,000
March 30	3,841,250	3,585,000	250,561,000	101,370,000	23,778,000	105,081,000
April 20	3,858,550	3,535,000	254,881,000	[1]102,817,000	24,779,000	103,323,000
April 27	3,845,250	3,555,000	256,670,000	102,452,000	24,997,000	102,552,000
May 25	3,835,650	3,580,000	259,330,000	100,297,000	28,356,000	104,015,000
June 22	3,846,450	[1]3,690,000	260,891,000	97,276,000	32,751,000	104,683,000
June 29	3,639,550	3,625,000	262,059,000	95,142,000	33,590,000	104,485,000
July 27	3,690,400	3,555,000	262,579,000	90,173,000	38,981,000	105,924,000
August 31	3,501,350	3,575,000	265,865,000	85,393,000	44,766,000	108,774,000
September 28	3,799,950	3,600,000	263,609,000	82,373,000	47,986,000	108,450,000
October 26	3,640,300	3,565,000	262,746,000	80,891,000	[1]48,893,000	108,475,000
November 9	3,584,200	3,510,000	261,631,000	[6]79,847,000	48,408,000	107,687,000
December 7	3,612,600	3,460,000	261,152,000	81,062,000	44,305,000	105,353,000
December 14	3,578,950	3,495,000	261,293,000	81,234,000	43,935,000	104,105,000
December 21	3,621,200	3,585,000	262,488,000	81,870,000	42,260,000	102,841,000
December 28, 1940	3,385,500	3,585,000	261,552,000	83,274,000	42,246,000	102,620,000
January 4, 1941	3,367,200	3,600,000	.....	85,053,000	42,403,000	102,448,000
January 4, 1940	3,584,450	[8]3,427,000	[4]237,742,000	83,911,000	32,782,000	105,239,000
Change in past year	−6.1%	+5.0%	+10.0%	+1.4%	+29.3%	−2.7%

[1] All time peak. [2] Peak for year. [3] Lowest since April, 1922. [4] Stocks, December 30, 1939. [5] Lowest since October, 1922, due to shut down of six mid-Continent states. [6] Lowest for year. [7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California. [8] January, 1940, daily average.

to January 3. The new price is 6 cents higher than that previously paid. The field produces about 3000 barrels daily of heavy crude that is desirable for manufacture of lubricants.

Demand for tankers for movement of oils from the Gulf Coast to the Atlantic seaboard has continued firm, and previously asked high prices still are quoted by owners. In one recent fixture, rates were lowered 15 cents a barrel, from 70 to 55 cents on gasoline, as some tonnage was temporarily idle because of relatively mild weather in the East. Subsequently, however,. colder weather stimulated the demand for tanker tonnage, and the old chartering prices were quoted.

Crude Output Far Under Demand for Third Week

United States crude oil production continued exceptionally low for the third consecutive week, because of strict curtailment in Texas, in the seven days ended January 11, having averaged 3,372,725 barrels daily.

That was 20,450 barrels a day more than output in the previous week but 218,275 barrels less than daily average demand for domestic crude as estimated for January by the United States Bureau of Mines.

Texas averaged 1,122,800 barrels daily, which was 2500 more than in the previous week but 174,700 less than indicated market demand. The state's fields were shut down again for three days instead of the usual two, for the third consecutive week, having been closed in on January 5, 8 and 11. The shutdown of January 8 was a special closing, ordered as an emergency measure.

California production increased to 612,400 barrels daily from 591,900 the week before, and exceeded demand about 17,000 barrels.

Oklahoma declined 16,350 barrels to

Wholesale Prices of Refined Products

REFINED GASOLINE	Range late Last week (Cents a gal.)		Changes from week Before	
Oklahoma Refineries:				
60 Octane and under	3¾	4¼	...	...
63-66 Octane	4⅛	4½	...	...
72-74 Octane	4½	5	...	...
Mid-Western Tank Car:				
60 Octane and under	3¾	4⅛	...	...
63-66 Octane	4⅛	4½	...	...
72-74 Octane	4½	5	...	...
New York Harbor:				
68-70 Octane	5½	5⅝	...	...
72-74 Octane	5½	6⅝	...	...
Gulf Coast:				
60 Octane unleaded	3¼	4	...	...
65 Octane unleaded	3½	3¾	...	...
72-74 Octane leaded	3½	4¼	...	...
NATURAL GASOLINE				
Grade 26-70:				
F.O.B. Group 3	2⅝	2⅝	...	...
F.O.B. Breckenridge, Tex. 2		2	...	...
KEROSENE				
Oklahoma Refineries:				
41-43 water white	4	4⅛	...	...
42-44 water white	4⅛	4⅜	...	+⅛
Mid-Western Tank Car:				
41-43 water white	4	4⅛	...	...
42-44 water white	4⅛	4⅜	+⅛	+⅛
New York Harbor	5⅛	5⅛	...	...
RANGE OIL				
At Oklahoma Refineries	4	4⅛	+⅛	+⅛
In Mid-Western Market, Group 3, basis	3⅞	4	...	+⅛
LIGHT FUEL OILS				
Oklahoma Refineries:				
No. 1 straw	3½	3⅞	...	+⅛
No. 3	3⅜	3½	...	...
Mid-Western Tank Car:				
No. 1 white	3¾	4	...	...
No. 3	3¼	3½	...	...
New York Harbor:				
No. 1	5½	5½	...	...
No. 3	4⅞	4⅞	...	...

HEAVY FUEL OILS	Range late Last week (Per Bbl.)		Changes from week Before	
Oklahoma Refineries:				
No. 6	$0.65	$0.65	+.05	+.05
Mid-Western Tank Car:				
No. 5	.75	.85	...	...
No. 6	.55	.60	...	...
New York Harbor:				
No. 5	1.45	1.55	...	...
No. 6	1.25	1.25	+.10	...
BUNKER C FUEL OIL (Per barrel, ships bunkers)				
Gulf Coast	$ .80	$ .90	...	...
New York Harbor	1.25	1.25	+.10	...
DIESEL OIL (Per barrel, ships bunkers)				
Gulf Coast	$1.50	$1.70	...	...
New York Harbor	2.00	2.00	...	...
Los Angeles Basin, 27 gravity	1.20	1.35	+.05	...
LUBRICATING OIL (Cents a gal.)				
Oklahoma Refineries:				
Bright Stock, 150-160 viscosity at 210°, 10-25 pour test	12	15½	...	...
Neutral oil, pale No. 3 color, 150 viscosity at 100°, 0-10 pour test	8	10¼	...	...
Western Pennsylvania:				
Bright Stock, 145-155 viscosity at 210°, 25 pour test	12	13	...	...
Neutral Oil No. 3 color, 150 viscosity at 70°, 25 pour test	19	20	...	...

Crude Oil Production Continues Exceptionally Low

Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (January)	State Allowable (Barrels Daily in January)	BARRELS DAILY FOR WEEK ENDED Jan. 4	Jan. 11
TEXAS—				
Texas Panhandle	.....	.....	70,900	72,100
North Texas	.....	.....	91,200	92,000
West Central Texas	.....	.....	29,500	29,500
West Texas	.....	.....	173,800	175,600
East Central Texas	.....	.....	77,400	74,900
East Texas Field	.....	.....	300,700	301,500
South Texas	.....	.....	165,300	164,200
Texas Gulf Coast	.....	.....	211,500	213,000
Total Texas	1,297,500	1,370,000*	1,120,300	1,122,800
CALIFORNIA—				
Long Beach	.....	.....	39,700	49,800
Midway-Sunset	.....	.....	37,900	50,400
Kettleman Hills	.....	.....	39,500	37,500
Wilmington	.....	.....	80,100	80,300
Others	.....	.....	394,700	403,400
Total California	594,800	571,000†	591,900	612,400
OKLAHOMA—				
Oklahoma City	.....	.....	104,200	84,750
Seminole Area	.....	.....	100,025	100,400
Others	.....	.....	200,400	203,125
Total Oklahoma	439,000	390,000	404,625	388,275
ILLINOIS—				
Salem	.....	.....	116,700	113,300
Louden	.....	.....	71,500	69,500
Centralia	.....	.....	15,100	14,200
Other New Pools	.....	.....	113,500	118,800
Old Pools	.....	.....	10,700	10,200
Total Illinois	363,600	.....	327,500	326,000

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (January)	State Allowable (Barrels Daily in January)	BARRELS DAILY FOR WEEK ENDED Jan. 4	Jan. 11
LOUISIANA—				
North Louisiana	.....	.....	68,200	68,800
South Louisiana	.....	.....	223,800	224,500
Total Louisiana	287,400	292,756	292,000	293,300
KANSAS	191,000	194,000	181,450	189,000
NEW MEXICO	100,000	104,000	101,400	101,500
EASTERN STATES—				
Pennsylvania Grade	48,000	.....	68,600	73,500
Others, Eastern	47,800	.....	21,100	20,700
Total Eastern States	95,800	.....	89,700	94,200
MOUNTAIN STATES—				
Wyoming	73,900	.....	72,800	75,200
Montana	19,000	.....	18,200	18,100
Colorado	3,900	.....	3,500	3,500
Total Mountain States	96,800	.....	94,500	96,800
MICHIGAN	46,100	41,000‡	42,200	42,100
ARKANSAS	66,100	70,666	68,700	69,500
INDIANA	20,000	.....	20,500	19,800
MISSISSIPPI	15,200	.....	14,900	14,800
NEBRASKA	2,000	.....	2,600	2,250
§Total 8 Prorated States	3,021,900	3,033,422	2,802,575	2,818,875
Total United States	3,591,000	.....	3,352,275	3,372,725

*** Estimated net basic daily allowables as of January 1. Railroad Commission estimates that actual production normally is about 3 percent under the allowable. But allowable normally increases as new wells are completed. Under December-January order, most Texas fields were ordered shut down January 1, 4, 5, 8, 11, 12, 18, 19, 25, 26.**

† Recommendation of Conservation Committee of California Oil Producers.

‡ Estimate of actual production under prescribed regulations, which do not fix a definite state total allowable.

§ Texas, California, Oklahoma, Louisiana, Kansas, New Mexico, Arkansas, Michigan.

388,275 daily and was 50,725 under demand.

Kansas output rose 7550 barrels to 189,000, but was 2000 below demand.

Illinois, Louisiana, and New Mexico showed only nominal changes.

Pacific Coast Domestic Demand at All-Time Peak

Domestic demand for all petroleum products in the five Pacific Coast states reached an all-time peak during November at 561,000 barrels daily, the United States Bureau of Mines reported in its final statistical review for that month. This is an increase of 26,000 barrels daily over October, and an increase of 63,000 barrels daily over November, 1939, demand.

A sudden pick-up of 15,000 barrels daily in demand for gas-oil and Diesel oil, which had lagged during the past few months, accounted principally for the increase, the bureau said. Domestic demand for heavy fuel oils continued to increase, and reached the high total of 253,000 barrels daily, 12,000 barrels daily more than last month and 27,000 barrels daily more than in November, 1939. Domestic gasoline demand remained at almost the October level, having decreased only 1000 barrels daily to 182,000 barrels daily. Shipments of all products to points outside the five states decreased 8000 barrels daily, to 165,000 barrels.

The bureau reported November exports of products to Japan and Kwantung to include 1,088,000 barrels of crude, 89,000 barrels of gasoline, 292,000 barrels of lubricants, 429,000 barrels of gas-oil and distillate fuel oil, and 179,000 barrels of fuel oil.

Stocks of all products in the Pacific Coast territory at the end of November were reported at 151,419,000 barrels, a decrease of 2,180,000 barrels from the total of 153,599,000 barrels on hand at the end of October, this year. Crude oil production for November was placed at 18,231,000 barrels; natural gasoline at 1,272,000 barrels.

Japanese Oil Purchases From U. S. 45 Million in 1940

Japan bought $37,672,000 worth of petroleum products from the United States in the first 10 months of 1940 as against $35,761,000 worth in the corresponding period of 1939. Indications are total purchases of petroleum products from the United States during 1940 will amount to around $45,000,000.

Department of Commerce figures show Japan bought over 9,000,000 barrels of crude oil from the United States in the first 10 months of 1940. Gasoline imports of Japan from the United States totaled 1,749,000 barrels valued at $9,426,000.

Ask K-M-A Ellenberger Be Spaced to 20 Acres

Twenty-acre spacing for wells producing from the Ellenberger in the K-M-A field, Wichita and Archer counties, has been requested at a hearing before the Texas Railroad Commission. The wells would be located 330 feet from lease lines and at least 660 feet apart, according to a program presented by Fain-McGaha Oil Corporation.

Of more importance, however, will be the proposal to assign 40 acres to one well for proration purposes, if the acreage is in contiguous tracts, and no more than 1320 feet from the well.

Under the plan proposed, 75 percent of the production would be distributed on acreage and 25 percent on the well. As much as 50 acres could be assigned to the final well on a lease.

The first well in the Ellenberger was completed by Fain-McGaha Oil Corporation at Griffin B-16. It is producing from 4372 to 4389 feet.

Pipe Lines

Humble Enters Hawkins Field With 6-inch Line

Humble Pipe Line Company will extend its system to the new Hawkins field, Wood County, East Texas, and will be in position to serve the field as a transporter of crude as soon as the line can be completed. The extension will involve 5½ miles of 6-inch pipe, connecting with the company's Van line.

Humble Oil & Refining Company will enter the Hawkins field as a purchaser, and will post a price of 78 cents a barrel. Prior to completion of the pipe line into the field, and as an aid to the producers of the area in marketing their oil in the interval, the company will accept deliveries of Hawkins crude into the Longview station of Humble Pipe Line Company by truck, paying the field price of 78 cents plus 5 cents per barrel.

The field at present has two producing wells.

Permission Granted for 38 Miles of Gas Pipe Line

The Michigan Public Service Commission has granted a permit to Consumers Power Company to construct an adidtional 38 miles of 12¾-inch gas transmission line, supplementing 22 miles now under construction.

The 60 miles of line, when completed, will provide a gas outlet for new fields in Riverside Township, Misaukee County; Marion Township, Osceola County; Winterfield Township, Clare County, and Wise Township, Isabella County. The line will be joined at Dice's station seven miles west of Midland, to the company's 8-inch line built in 1931, which is a feeder to Saginaw, Bay City and smaller cities.

Turner Petroleum Buys Stanolind Michigan Property

Turner Petroleum Corporation announced purchase of the last of Michigan oil properties owned by the Stanolind Oil & Gas Company, a subsidiary of Standard of Indiana. The purchase included three seperate leases with 11 producing wells, drilled between 1930 and 1934, in the old Mt. Pleasant pool. Stanolind has not been active in Michigan since 1936.

JUDSON SWEARINGEN, of the department of chemistry, University of Texas, will address the Houston Geological Society at noon meeting January 16 on "The Comparison of Laboratory Estimates of Actual Recycling Recoveries." The meeting will be on the mezzanine floor of the Texas State Hotel.

Mexico

Mexican Workers to Oppose Oil Industry Reorganization

Work on completion of general plans for reorganization of the Mexican oil industry occupied the Avila Camacho administration in Mexico during the week. Initial steps of solution of the dilemma, regarded as that country's most important economic problem, closely followed the official ending of worker administration of the railroads on January 6. Under worker administration the national railways had piled up a deficit of 13,000,000 pesos; under the same sort of management the oil industry has shown a deficit of 68,000,000 pesos.

General Efrain Buenrostro, new general manager of the oil industry, recently appointed by Camacho, is expected to start the reorganization ball rolling by ordering wage cuts, drastic reductions in personnel, the tightening of discipline, and a number of operating economies, including reduction of several employee benefits.

Just as previous attempts to put the railroads on a paying basis by cutting expenses down to some figure below income were met by passive and other kinds of resistance from employees, it is expected that efforts to put the oil business on a businesslike basis also will meet with resistance. Hence, President Avila Camacho's labor principles, which for Mexico are conservative in comparison with those of ex-President Cardenas, in all likelihood soon will be challenged. And while it is not certain that the administration will emerge victorious from such a contest, business generally concedes the outlook for victory is better than it would have been under the more radical Cardenas regime.

Granting that the long range outlook for oil may be brightened by reorganization steps to be taken in the first quarter of this year, the immediate outlook is not too cheering. Mexico's best pre-war customers, Italy and Germany, now are behind the British blockade and unable to obtain Mexican oil for their refineries. Latin America, comprised of countries which normally would constitute logical customers for Mexican crude, lacks refining capacity. So does Mexico, which always has been primarily an exporter of crude oil.

Some help was given to Mexico's export situation recently by revision of quotas of United States imports as provided for in the reciprocal trade agreement with Venezuela, originally promulgated November 6, 1939. President Roosevelt's proclamation last week increased Mexico's share of United States imports from 3.8 to 5.1 percent of the allowed total.

Part of the oil industry economy program calls for shutting down two refineries: that formerly operated by Pierce interests at Mata Redondo and the one formerly operated by Huasteca Petroleum Company at Arbol Grande in the Tampico sector. Machinery and equipment will be moved from these factories to the government refinery at Ciudad Madero. This latter plant formerly was operated by Mexican Eagle Oil Company. Equipment for making metallic drums will be retained at Mata Redondo and Arbol Grande, where production of gasoline has ceased to be profitable under government operation.

U. S. FIELD OPERATIONS

Illinois-Indiana

Franklin Wildcat Indicates Benton Townsite Boom

A pool-opening Franklin County well on the outskirts of Benton was nearing completion in the Tar Springs, indicating a townsite boom may be in the offing. E. S. Adkins' Orient Coal Company 1, NE SW SE 24-6s-2e, swabbed 142 and 167 barrels of oil in two 24-hour tests prior to a 15-quart shot at 2120-48 feet. Casing is set at 2112 feet. The well cemented pipe some time ago, but was shut down until recently. Just north of Orient 1, H. H. Wegener, drilling contractor for the discovery, has spudded the first test in Benton. Recently Wegener posted $160,000 in bonds and $6400 cash to obtain 32 townsite permits from the Benton council.

That Orient 1 may have tapped a large structure was indicated when casing was set to 2052 feet at Adkins Orient 1-B, four miles south of Orient 1, and just two miles north of West Frankfort. Orient 1-B is in the SE NE NW 12-7s-2e and was drilled to the McClosky at 2989 feet before being plugged back to test the Tar Springs show. Orient 1-B, at an elevation of 385 feet, topped Tar Springs at 2040 feet. Orient 1, at an elevation of 452 feet, topped the formation at 2111 feet.

Also being completed was a pool-opening White County well, two miles south of production on Ribeyre Island, A. L. Cochran et al's Hattie Golden 1, SW SE NE 29-5s-14w, which appears to be a 200- or 250-barrel producer in Waltersburg sand at 2255-90 feet. Tubing was being run preparatory to placing the producer on pump. Estimates of production were based on swabbing tests.

A wildcat test 1½ miles east of Patoka, Marion County, Obering & Phillips' Thalman Heirs 1, NW 35-4n-1e, was waiting on cement after finding saturation in Cypress sand at 1350-60 feet. An extensive royalty buying campaign has been underway since pipe was set. If the well is successfully completed, it will be the first discovery in Marion County since 1939.

Another wildcat which may open a new field is in Edwards County, two miles southwest of Bone Gap, Tide Water Associated Oil Company's Gawthorp 1, NE NE NE 13-1s-10e, where fluid rose 750 feet during a drill-stem test open 90 minutes. The test was made in McClosky lime at 3265-86 feet, and showed 540 feet of oil, 120 feet of drilling mud, and oil cut with gas and 90 feet of sulphur water. Operator planned to continue drilling in search of a second McClosky break, but will set pipe to test the show already found, regardless of whether additional pay is found.

Sandoval St. Peter Test Dry

Marion County's St. Peter test, B. E. Martin's Robinson 1, Sandoval field, SE SW 4-2n-1e, was abandoned at 5023 feet after finding water in the St. Peter. Operator reported top of formation at 4979 feet, but other sources called the top 4993 feet. The test, an old Devonian producer, also found the Trenton lime dry.

In the county's Lake Centralia-Salem field, Paul Rossi's Brooks 8, first Trenton venture there, was drilling Trenton lime at 4530 feet. The well, in the NE SW 29-2n-2e, set 5½-inch casing to about 4510 feet. Some saturation was reported in the top part of the formation, although the test is being drilled extremely tight.

Another key test, Carter Oil Company's straigraphic core drill venture in the Loudon pool, Fayette County, has been completed, but the company has not revealed any of its findings. The test was drilled on the Hogan acreage near the center of the field, and is believed to have been carried through the St. Peter, possibly to a depth of 6000 feet. Operations began November 15 with a portable rig.

First Aux Vases producer in the Calvin field, White County, Ryan Oil Company's Bessie Bramlett 7-A, SW SE SW 17-4s-14w, was being completed. The well, a southwest outpost to the pool, had 2200 feet of fluid in the hole. It carried water in both the Cypress and Benoist, other producing horizons in the area.

A perplexing problem in Oakdale township, Washington County, grew more acute with abandonment of a third test near a well recently completed in Benoist sand as a discovery. The newest abandonment is Harry Hubbard's Fox Heirs 1, SE NW SW 20-3s-4w, bottomed at about 1060 feet through the Benoist. It was ½ mile north and some west of the discovery, Hunleth 3 which is still producing about 150 barrels daily. Offsets east and west of Hunleth 3, drilled by Joe Murphy and W. C. McBride, Inc., were dry. Only offset acreage not as yet explored is held by McBride and lies south of the discovery.

An offset test to the pool-opening well at Dahlgren, Hamilton County, has been started by Exchange Oil Company, Eddie Sullivan 1, just east of Dick Duncan's Zellar 1, SE NE NE 34-3s-5e, producing about 350 barrels daily from McClosky lime at 3337-59 feet.

Magnolia Petroleum Company's wildcat near Murphysboro, Jackson County, Ella Smith Heirs 1, NE 9-8s-3w, was drilling at about 3230 feet. The venture will explore the Trenton, and possibly the St. Peter formation.

A Pope County wildcat near McCormack, L. V. Garnier's Peoples 1, NE NE NE 30-11s-5e, bailed only a light show of oil and some acid water following a treatment in McClosky lime. Some observers believed the show of oil which prompted operators to cement casing was in the Rosiclare, and there is some talk that the well may be deepened in search of another break.

A west offset to the discovery well of the West Centralia field was spudded Wednesday, A. R. Venuto's Phoenix-Taylor 1, NE NE SE 15-1n-1w. There is only one producer in the pool, a 20-barrel Cypress well.

New Tests Start in Knox and Posey Counties

In the St. Thomas pool of Knox County, south of Vincennes, Midwest Development Company spudded I. Ward Frey 1, SW SW SW 78-2n-11w, ¾ mile north of W. C. McBride, Inc.'s Metropolitan Life Insurance Company McClosky producer.

In a new pool of southern Point Township, Posey County, J. W. McCummings located Oakland City College 1, southeast offset to Basin Drilling Company's Oakland 1, discovery completed in the Aux Vases. Drilling at about 1500 feet was Basin Drilling Company and North Central Oil Company's Oakland 1, south offset to the discovery well.

Abandoned was a Pike County wildcat, four miles northeast of Princeton, Schroeder and Hermann's Stroble 1, SW SW SW 34-1s-9w, bottomed at 1740 feet, through a dry McClosky.

After prolonged shut-down, work has been resumed on a Warrick County wildcat, just north of Yankeetown, Yankeetown Development Company and Hambuecken & Taylor's Wilson Taylor Heirs 1, SW SW SW 10-7s-8w, which had been standing at 1550 feet.

In the south part of the Rockport field, Spencer County, James C. Ellis, Owensboro, was drilling at 1050 feet for Spence 1, NW SE 29-6s-7w, apparently dry through Rockport and Palestine sands.

Kentucky

Union County Wildcat Among New Starts

In Union County, three miles southwest of Corydon, Sun Oil Company and Kentucky Natural Gas Company located Neels Heirs (Virginia Beels Briggs) 1, 2½ miles southwest of Sun Oil Company's J. Shead Clark, abandoned recently after testing a slight show in the McClosky. Basin Drilling Company, Owensboro, is contractor, and holds some of the offset acreage.

Sun Oil Company's George Woods 1, eight miles west of Litchfield, Grayson County, closely-watched wildcat now in the Ordovician age, resumed drilling after a prolonged fishing job at about 2400 feet.

In the old Grinstone Hill pool of McLean County, a mile south of Glenville, Stewart & Snyder abandoned Hansford 1, offset to The Ohio Oil Company's Lee Murray 1, old well drilled deeper and completed in the McClosky. Hole was bottomed at 1762 feet.

In the Utica field of Daviess County, a mile southeast of Handyville, James C. Ellis' Ellis 1, Section 15-N-29, was a McClosky completion, initialing 40 barrels a day on pump. Hole was bottomed at 1705 feet.

Oklahoma

Series of Discoveries Gives New Year Good Start

A Wilcox-sand discovery was apparent at W. A. Delaney, Jr., and Atlantic Refining Company's Clark 1, NEc SE 30-8n-7e, between north end of Little River and East Little River pools, Seminole County. Bit went into soft Wilcox sand at 4272 feet and drill-stem test at 4266-76 feet recovered 1,000,000 cubic feet of gas. Core at 4276-80 feet showed another 1,000,000 cubic feet of gas in upper Wilcox sand with no water present. Coring will be continued until the oil level is tapped. This wildcat checked 25 feet structurally higher than a test ¼ mile southward which showed oil in Wilcox, yet was uncommercial.

Two and one half miles south of Maud pool and northeast of St. Louis pool, Pottawatomie County, Kerlyn Oil Company's Cherry 1, SE NE NW 32-8n-5e, drilled plugs under 7-inch casing at 4320 feet and hole filled 350 feet with oil. With 5 feet of open hole, the wildcat filled 650 feet with oil in less than an hour. Strong gas pressure is following this fill-up. Dolomite was topped at 4290 feet for a good show of oil. Tight dolomite was recovered in a core at 4301-12 feet but good staining showed. Hole is bottomed at 4325 feet in dolomite and operators tested after an electric log record showed favorable. Upper log on this wildcat marks Senora zone at 3560 feet, sand at 3590-3615 feet, for a show of oil, Maves topped at 3855 feet, Woodford 3968 feet, Hunton 4090 feet, Sylvan 4110 feet, Viola 4195 feet and Dense 4240 feet.

Alma Oil Company's Hill 1-A, C N½ NW SW 1-21n-5e, between Skedee pool and Pawnee, proved a new Wilcox sand pool after flowing 500 barrels of oil and 600 barrels of water in 22 hours. It is shut in for additional tankage. Pay was penetrated at 3363-67 feet and bit went into hard chert at 3367-69 feet. Upper formation log on this important discovery notes Avant topped at 1745 feet, Hogshooter 2025 feet, Layton 2130 feet, Checkerboard 2410 feet, Cleveland 2460 feet, Oswego 2640 feet, Pink limestone 2955 feet, Inola 3026 feet, Mississippi 3140 feet, Chat 3345 feet and Wilcox sand at 3363 feet.

Selden Henry, Jay Walker et al's Dudgeon 1, NE SW SE 35-12n-9e, north of Okemah, Okfuskee County, is a pool opener after flowing 168 barrels of oil in 3 hours while cleaning out. Following this initial test, the wildcat gauged 95 barrels the next hour through open casing. Gilcrease sand was shot with 53 quarts at 3084-3110 feet. Pipe line outlet is to be supplied by Sinclair Prairie Pipe Line Company. The oil tested 35 gravity in early tests but is expected to increase slightly when flow has cleared. Jack Harvey, Arrow Drilling Company and Keener Oil & Gas Company are also interested in this strike with the latter operating the lease. Soft ground and bad weather have delayed bringing in pipe.

Harper & Turner Oil Company's Harner 1, NWc SW 17-14n-2w, 5 miles northeast of Edmond pool, Oklahoma County, and west of a dry Wilcox sand test drilled by Anderson-Kerr et al, sprayed 20 to 30 barrels of crude per day with 2,000,000 cubic feet of gas and a show of water. Chicken Farm was topped at 5925 feet and pay penetrated only 4 feet. A water shut-off will be completed prior to further testing. Location is on a seismograph high.

Alma Oil Company is testing for commercial production in both Booch and Gilcrease zones at Shepherd 1, NE SE NW 4-8n-8e, 3 miles south of Bethel pool, Seminole County. After testing water in second Wilcox sand at 4331 feet, casing was perforated at 3309-10 feet in Cromwell sand for a small show of gas. With Booch sand topped at 3025 feet and Gilcrease logged at 3150 feet, casing was next perforated at 3143-50 feet with 21 shots for 1,000,000 cubic feet of gas and 5 barrels of oil per hour.

Shell Oil Company's Davis 1, SWc 18-13n-9e, a wildcat south of Welty, Okfuskee County, fished tools out of the hole at 4127 feet in Wilcox sand and set cement plug at 4060 feet in Viola lime. Operators will re-drill Wilcox sand and attempt to shut-off water. Previously the test made 7 barrels of oil and a greater volume of water per day.

Deep Rock Oil Corporation's Davis 1, SW SE NE 20-11n-9e, northeast of East Cromwell pool and southeast of Dill pool, Okfuskee County, topped dolomite at 4073 feet for a small show of oil. At 4108-15½ feet, core barrel recovered 7½ feet of sand with a small show of oil in the top and white salty sand in the base. Second Wilcox sand was logged at 4105 feet and showed a small amount of oil with eight times that volume of water to 4147 feet. Hole is being deepened below 4190 feet.

New Horizon for Byars

Patsy Oil Company's Bond 1, NW NE NE 16-5n-3e, discovery well of the Byars pool, McClain County, plugged back to 2635 feet from an old total depth of 3623 feet in Viola lime. Pipe was perforated at 2610-30 feet in the Hogshooter. Flow gauged 60 barrels of oil and 15 barrels of water in 24 hours to open the second producing horizon for this Viola lime pool.

Shell Oil Company's Brewer 1, SE SW NW 1-10n-8e, south edge of East Cromwell pool, was dry in Cromwell sand at 3532-82 feet, and is deepening below 3975 feet.

Kansas

Arbuckle Lime Production Opened at Iuka

Skelly Oil Company opened initial Arbuckle lime production in Iuka pool, Pratt County, at Helmke 1, SWc 1-27-13w, which rated a physical potential of 1572 barrels in 24 hours. This semi-wildcat is a ¼ mile north of 5 shallower Simpson dolomite producers with a total potential of 4642 barrels daily. Arbuckle lime was topped at 4353 feet and penetrated to 4367 feet. Pay was treated with 500 gallons of acid and then with 1000 gallons. Oil tested 39.1 gravity corrected. January allowable for Iuka is 3329 barrels.

North Kraft, Barton County, was extended as Phillips Petroleum Company completed Frees 1, CSL SW NW 35-16-11w, for 48 barrels per day on a swabbing test. Arbuckle lime is pay at 3394-3401 feet. Sam Schneider may extend Keesling, Rice County, at Henne 2, 9-20-9w, which is rigging up standard tools to test a good show of oil in Arbuckle lime at 3250 feet.

Earl Wakefield et al have 1300 feet of oil in the hole in 2 hours in their semi-wildcat in Section 29-17-10w, between Bloomer and Stumps pool, Ellsworth County. Testing was underway after acidizing Arbuckle lime at 3300 feet with 3000 gallons.

Perry Thayer, Derby Oil Company, Jim McMorrow and Kiowa Drilling Company have a small pool opener at Roach 1, NWc SE 12-22-14w, a wildcat strike 6 miles west of Drach pool in Stafford County. After treating Arbuckle lime at 3747-89 feet with 1000 gallons of butane and 1000 gallons of acid, swab recovered 4 barrels of 26-gravity oil per hour for 3 hours.

Aikman and Braden et al's Sasse 1, NW NE SW 36-23-13e, a wildcat in the west flank of Winterschild pool, Greenwood County, tested 2 barrels of oil in 12 hours. Pay is Mississippi lime at 1747-53 feet. Lime was topped at 1708 feet and 6-inch casing cemented at 1712 feet.

Wildcat Failures

Cities Service Oil Company's Kuehnl 1, NE SW SW 34-9-21w, 3 miles south of Morel pool, Graham County, topped Lansing lime at 3650 feet and based Kansas City at 3765 feet. Hole was plugged in dry Arbuckle lime at 3970-99 feet. Reworked Arbuckle lime was logged at 3439 feet.

Patton Drilling Company and Lion Oil Refining Company's Werth 1, C W½ SW SE 10-16-19w, 6 miles southwest of Madden pool and 7 miles southeast of Penny-Wann pool in northern Rush County, was plugged as uncommercial. Lansing lime, topped at 3380 feet, was perforated with 12 shots at 3442-46 feet but failed to show. Operators then perforated with 36 shots at 3418-25 feet and recovered 2 gallons of water with a small show of oil. After being shut in for 9 hours, hole filled 175 feet with water and a small amount of oil. This wildcat orginally drilled to 3178 feet in La Motte sand, topped at 3710 feet.

Harper & Vandeverter abandoned Tollman 1-A, NEc 15-28-11e, 7 miles east of Severy pool, Greenwood County, at 1301 feet.

Cities Service Oil Company's Crandall 1, NWc NE 23-23-10w, 9 miles northeast of Zenith pool, Reno County, topped Simpson shale at 3890 feet, sand at 3891 feet and filled 2800 feet with water at 3901 feet. Hole is being deepened below 3945 feet.

Vickers Petroleum Company's Stewart 1, C E½ NE NE 22-25-11w, 2 miles south of abandoned Neola pool, Staf-

ford County, topped Lansing lime at 3487 feet and based Kansas City at 3770 feet. Conglomerate was topped at 3858 feet, Kinderhook at 3861 feet, Viola at 3895 feet and is circulating at 3910 feet.

Alva Billings et al's Ryan 1-A, C E½ NE SE 27-8-32w, Graham County test, is moving in a heavier rig front to underream 7-inch casing. Hole is bottomed at 3805 feet. Last geologic marker is Neva lime topped at 3620 feet. A small fill-up of oil was noted at 3720-24 feet after treatment with 2000 gallons of acid.

Stearns Drilling Company et al's Witt 1, C S½ NE SW 28-12-16w, 1¾ miles north of Emmeram pool and 2 miles south of Blue Hill pool, Ellis County, topped Lansing lime at 3342 feet and logged a show of oil at 3342-72 feet. Hole filled with water at 3372 feet but 6-inch casing was cemented at 3384 feet and at 3502 feet, the wildcat started swabbing ½ barrel of oil per hour. Hole is being drilled deeper below 3595 feet.

Stanolind Oil & Gas Company's Musenberg 1, C E½ SE SE 1-19-11w, a northwest offset to the East Rick discovery, Barton County, and probable third producer for the pool, has a difficult clean out job at 3360 feet in Arbuckle lime where it is showing for a minimum producer. Attempts will be made to acidize into a commercial producer.

Forest City Basin

Nebraska Wildcat Effort Lacks Encouragement

Francis Krone and Skelly Oil Company's Morehead 1, C SE NE 35-4n-16e, 22 miles southeast of Auburn, Nemaha County, Nebraska, and 15 miles north of Falls City pool, was plugged as dry at 3770 feet in Arbuckle lime. Geologic tops on this deep wildcat test disclosed Lansing lime at 918 feet, Mississippi 2225 feet, Kinderhook 2393 feet, Hunton 2906 feet with a core at 2638-48 feet giving a 5½ foot dry lime section. Viola lime was topped at 3333 feet, St. Peter (Wilcox) 3721 feet and Arbuckle lime at 3736 feet. No shows were encountered at this test.

Powers et al's Lee 1, NE NW NE 16-1n-14e, south of abandoned Ogle pool, Richardson County, Nebraska, topped Hunton lime at 2314 feet and cored at 2275-92 feet for a 17-foot lime recovery without shows. A 16-foot section at 2294-2307 feet was dry and cores at 2307-22 and 2322-41 feet were dry. Hole was abandoned at 2341 feet.

Uhri Oil Corporation plugged Ogle 1, NW SE SE 9-1n-14e, Richardson County, as uncommercial. It was pumping 300 barrels of fluid every 8 hours with an estimated 98 percent water. Hunton lime was productive for a short time at 2258-60 feet. Same operators abandoned location for Wittwer 1, NE SE SW 8-1n-14e, west of the pool.

Indian Territory Illuminating Oil Company abandoned Ege 1, C NE SE 19-3n-16e 1 mile northeast of Shubert pool, at 2651 feet in Hunton lime topped at 2615 feet.

Skelly Oil Company completed another producer in Falls City pool at Wallraff 3, SE NW SE 20-1n-16e, which pumped 618 barrels in 24 hours. Pay is Hunton lime at 2224-52 feet.

East Texas

Hawkins Outpost Establishes High Structural Position

Establishing the highest structural position recorded so far on the Hawkins dome, Hollingsworth Drilling Company's Robbins 1, northeast outpost for the townsite sector, was drilling in oil sand at 4600 feet. It was due to be carried 100 to 150 feet deeper than the earlier townsite completion before running electrical formation survey to determine casing point. In the meantime, owners of leases on the west side of the town were relieved of danger of a crater developing from Bobby Manziel et al's junked gasser in the sub-Clarksville when the ground fissures were checked late January 9 by killing the revised gas flow by filling the hole with cement.

Hollingsworth Drilling Company's test logged top of the Woodbine series between 4395-4410 feet, with an elevation of 441 feet, being about 40 feet higher on structure than Rotundi et al's prolific townsite well. First gas sand was recorded at 4470 feet, and oil saturation was topped at 4568 feet.

Threat of a crater being formed around Bobby Manziel et al's Lee Bell 1, mile northwest of the Hawkins townsite producer, occurred January 8 when dry gas broke through ground fissures as far as 800 feet from the partially junked well. This outpost blew out December 29 with an estimated flow of 15,000,000 feet of gas from sub-Clarksville sand overlying the Woodbine series while drilling at 4363 feet. The flow was killed 7 days later by cementing the 2300-foot section of drill pipe frozen in the hole. However, the shutoff was not complete, as the gas broke through to the Nacatoch sand then reached the surface. The sub-Clarksville gas did not cause trouble in drilling two previous producers, so only 100 feet of surface pipe had been landed. However, field rules were later applied, requiring 1200 feet of surface pipe.

Completion of flowing wells in the Hawkins area within an elapsed period of 10 days promises to become a routine matter. The second townsite well now in process of completion spudded January 1 and reached the Woodbine on the eighth day. In the nearby East Texas field, where wells are approximately 1000 feet shallower, a week is ordinarily required to complete flowing wells. The Hawkins wells cost about $16,000 to drill and equip for flowing, but this price is due to be lowered as additional contractors move in heavy rigs and bid for contracts.

Two important outposts are starting up, and each will have considerable bearing on the structural conditions. William Goldston et al spudded J. M. Osborne-Sun 1, NEc 95½-acre tract, H. S. Cobb Survey, located 6500 feet south of townsite production, and 1½ west of a Woodbine failure. Edgar Johnston et al's J. M. Green 1, SEc 160-acre lease, John P. Mosely Survey, located 3 miles northeast of the townsite, has also spudded. Humble Oil & Refining Company controls the bulk of the acreage between this outpost and the townsite, while The Texas Company is also represented.

Refusal of the Texas Railroad Commission to act hastily on the mounting total of well permits sought by independents as exceptions to the emergency spacing rule of 20-acre units has temporarily deferred the drilling boom in store for Hawkins Dome. Conservative lease owners are seeking to forestall the threat of multiple drilling on small tracks and town lots. Repetition of the well spacing permitted at Kilgore, Gladewater, London and other densely drilled sectors of the East Texas field is possible unless the commission rigidly enforces its rules as many of the small lease owners prospered through excessive drilling in the big field. However, the margin of profit will be materially less since Hawkins crude is 29-gravity and must compete with Talco, Sulphur Bluff and Cayuga crude which vary from 65 to 78 cents per barrel in price, being among the lowest in the state.

Pittsburg Needs a Flush Well

Greater penetration of the Travis Peak sandstone is being made by Gulf Oil Corporation's Venters 1, west offset to the discovery oil well of the Pittsburg pool, Camp County, after yielding a small volume of free oil and oil-cut rotary mud on drill-stem test at 7949-8051 feet. Absence of any appreciable volume of gas proved disappointing. The discovery was carried to 8087 feet, possibly in water sand, before landing pipe on bottom to complete through perforations between 7948-8042 feet. A flush producer is needed by the area to stimulate drilling interest.

W. P. Vaughan et al's Chapman 1, Hopkins County wildcat that originally was abandoned as a failure in the Paluxy at 3934-4064 feet, tested salt water in using formation tester in Lower Trinity at 5641-65 feet. Massive anhydrite was called at 5040-5160 feet with an elevation of 412 feet.

Farrell Drilling Company and Gulf Oil Corporation's Bevill 1, Horn Hill area, Limestone County, was scheduled to resume drilling after squeezing off casing perforations at 4932-40 feet opposite Travis Peak water sand. No test was made of the Pettit zone which also gave encouragement for possible gas production.

The Frankston Townsite area, northeastern Anderson County, continues to receive attention pending a test of R. H. & W. Oil Company's Saunders 1, which has caused a substantial turn over of leases and royalty interests on the strength of its structural position. This wildcat is credited with having logged the Woodbine section at 4949-4960 feet with an elevation of 431 feet. A core was slated to be pulled late last week then run an electrical formation survey.

Big Field Busy

The East Texas field has regained its position of being among the most active drilling centers in the Southwest with a total of 56 operations listed. These involve 27 drilling tests and 21 derricks and rigs. Majors are drilling only two of the tests. Field activity began its upturn in mid-November and a large volume of well permits were

issued by the commission each week thereafter until the close of the year.

The Texas Railroad Commission has scheduled a hearing for January 20, at Hawkins, Texas, to consider operating rules of the new Hawkins field, Wood County.

Meanwhile, the commission issued temporary rules requiring 20-acre spacing and the allowables based on acreage and per well, with 75 percent of the oil assigned on the acreage factor.

The emergency rules also provide for 1200 feet of surface casing cemented to the surface, and an oil string cemented 1000 feet above the shoe.

The boundaries of the 20-acre proration units must be no further than 1050 feet from the well to which they are assigned.

Propose Three Crane-Upton County Areas as One Field

Testimony to the effect that Church-Fields, Gulf - McElroy and McClintic fields constitute one oil field in Crane and Upton counties, was presented at a hearing before the Texas Railroad Commission last week. P. P. Gregory, petroleum engineer, presented evidence to show that the combined area, 11 miles long and 2½ miles wide, is a continuous producing zone, despite the fact that the three fields as now designated were discovered at different times. The estimated productive area is 16,000 acres.

The hearing was called to consider an application for an increased allowable, and was combined with another hearing to determine proper operating rules for the three fields. Data was presented to show that Gulf-McElroy has produced 27,067,000 barrels; McClintic 3,178,000 barrels; and, Church-Fields 87,190,000 barrels. This was an average recovery of 2700 barrels per acre for Gulf-McElroy, 2275 barrels for McClintic and 14,500 for Church-Fields.

Gulf-McElroy now has 132 producing wells on 9500 acres, which are estimated to be productive. In the Church-Fields pool, there are 331 wells on 6000 acres, and 65 wells on the 1400 acres which constitute the productive area of McClintic.

Gregory pointed out that Gulf-McElroy included the best part of the structure, and that which was least developed. He expressed the opinion that the larger portion of the reserves was on this land. On the basis of these conclusions, he found that the rate of withdrawal in proportion to reserves was far lower in Gulf-McElroy than in the other two fields, and that the field could produce most efficiently at a rate varying between 25,000 and 30,000 barrels daily. The current allowance is 6344 barrels, after which the deductions for shutdowns must be made.

The increase was unopposed by other operators, but they attempted to show through cross-examination of Gregory that the drainage alleged from Gulf-McElroy to the other fields was much smaller than Gregory estimated. He thought as much as a million barrels might migrate from Gulf-McElroy into other fields over a period of years.

E. A. Wahlstrom, engineer for Gulf Oil Corporation, suggested proration units of 160 acres in a rectangular form, with the allowable based on acreage and average unit potentials.

West Texas

Abell Simpson-Sand Pool Numbers Four Operations

The entry of Phillips Petroleum Company into the Abell pool, Northern Pecos County Simpson-sand strike made last October, with a south offset to the discovery gives the area 4 operations. Rig is on ground for Sid Silverman 1, on 80-acre lease that expires July 9, 1941. The other tests are on short-term leases held by Magnolia Petroleum Company. The latter's Markey 1, ½ mile northwest of the producer, was drilling at 3615 feet after testing hole full of water following 19-shot perforations at 3445-53 feet. Nominal saturation, logged in the Permian at this level, was considered ample to warrant landing of 9⅝-inch pipe at 3535 feet for a production test. The company's Baldwin-State 1 and Sharp-State 1, outposts, were drilling at 1200 and 2860 feet, respectively.

Culbertson & Irwin, Inc.'s Heiner 1, first Ordovician test for the Byrne sector of the Pecos Valley field, Pecos County, installed cable-tool unit to deepen after failing to make a well in Ellenberger dolomite at 5128-88 feet following treatment with 1000 gallons of acid. Possible gas production in Permian at 4528-45 and 4625-28 feet will be tested by perforating 7-inch pipe, landed at 5130 feet, if the Ellenberger proves barren.

Two prolific completions for the Ellenberger horizon in the southeast portion of the Sand Hills field were recorded the past week. American-Liberty Oil Company et al's Tubb 11, near SE SW SE PSL Section 11, earned a potential rating of 4524 barrels pipe-line oil natural, with gas/oil ratio of 396/1. Production is from dolomite at 5743-72 feet, with top of Ellenberger called at 5740 feet. Gulf Oil Corporation et al's Tubb 2-A, indirect offset to the latter, responded to treatment of Ellenberger section at 5752-73 feet with 5000 gallons of acid, with a rated flow of 7170 barrels net oil, plus 16½ percent water, with gas/oil ratio of 293/1. The oil tests 37.6-gravity. The occurrence of water at irregular levels is not unusual for the Ellenberger in this field. Humble Oil & Refining Company's Tubb 46-X, ½ mile north of this deep sector, flowed 70 barrels of 32-gravity oil, plus 90 percent water, after using 1000 gallons of acid at 5767-80 feet, having plugged back from 5794 feet. Top of Ellenberger was called at 5762 feet, with an elevation of 2559, being 16 feet low.

Gulf Oil Corporation's University 1-F, Northeastern Crane County wildcat, was drilling extremely hard Devonian lime and chert at 8960 feet, having made only 53 feet the past week. Nominal shows of oil and gas have been noted in thin soft sections of the Devonian, but porosity is lacking.

Todd Test Has Oil Spray

E. M. Wahlenmaier and Steve Currie's Bean 1-A, semi-wildcat for the Todd structure, Crockett County, developed oil spray from lime at 1451-56 feet while carrying 9,900,000 feet of dry gas 1212-27 feet with an elevation of 2512 feet. Pipe was due to be set through the gas horizon to try for an oil completion, as no market is available for a gas well. In the Todd deep area, Continental Oil Company et al's Todd 7, west offset to the Crinoidal pay discovery, encountered the latter marker at 5570 feet, or 3113 feet subsea, being two feet lower than the original producer, but 280 feet higher than a small well ¼ mile to the west. Drilling was under way at 5660 feet after cementing 7-inch pipe at 5573 feet.

Amon Carter et al's Wasson 4-D, projected Ordovician test for the Gaines County portion of the Wasson field, was drilling hard lime at 9460 feet. It is due to continue to 10,000 feet, if necessary to reach the goal set after passing up two probable oil horizons below the regular Permian. Gulf Oil Corporation's Mallet 4, Northern Terry County semi-wildcat and 2½ miles west by south of the Slaughter field, was abandoned after testing water at 5070 feet, having plugged back from 6000 feet. This test was carried below the Holt, or Clear Fork zone in the Permian, with no porosity or saturation present. In view of the absence of structure, it was not considered a suitable test to try for production in the Tubbs 6881-foot oil pay recently established by Carter et al's Wasson 5-D in the Wasson field.

Trend of production northeast of the Waples-Platter pool, Yoakum County, was being explored by George Livermore and Tom Sloan's Owenby-Shell 1, C NE NE Section 502, three miles from production. The test was drilling at 2600 feet, having logged top of anhydrite at 2580 feet with an elevation of 3558 feet. Shell Oil Company contributed acreage and an $8500 dry-hole letter for the drilling of this test.

Expansion of the Duggan field, Cochran County, due west from the north edge of production, is to be sought by Magnolia Petroleum Company in starting operations on Woodley 2, located 1093 feet west of its Woodley 1, which registered a 1½-mile north extension last October. The company plans to move rig one location west along the south line of its 1280-acre lease following each new well.

McCaulley Prospect Receives Oil Well From Lime Pay

The McCaulley prospect in Eastern Fisher County recorded an oil producer after two previous tests to the north almost qualified as producers in 1928 and 1936. The discovery involves F. A. Stephenson, L. A. Long and George Wolf's Maberry 1, C SE SW HT&B Section 56, Block 1, mile southeast of McCaulley, testing 95 barrels of 40-gravity oil on 12-hour swabbing test from lime at 3298-3302 feet. The well is six miles southeast of nearest production, and is supported by a large block of leases. Storage has been erected preparatory to deepening the hole. R. W. Rainey et al drilled the first test, and had prospects of a pumper at 3285-89 feet before deepening to water.

General Crude Oil Company's Flannigan 12, second try for Ordovician production in the Royston field, Fisher County, has failed to recover lost drill

pipe at 5499 feet. The company's George 1, ½ mile northeast, was abandoned at 6494 feet in 1933 after 500-quart nitro shot at 5840-6060 feet yielded small volume of free oil with water.

Fain-McGaha Oil Corporation and Claude Dally are starting a Jones County wildcat south of the Hawley pool, having made location on the Julia Moore tract, T. O. Maltby Survey No. 252. In the Stith-Kelso pool, Danciger Oil & Refineries, Inc., spudded Kelso 2 and Gale 1, located northwest and southeast, respectively, of the discovery, which flowed 139.8 barrels of 43-gravity oil natural on 16-hour proration gauge from Flippen sand at 2335-41 feet.

Only Four Permits Issued In Texas During Week

The Texas Railroad Commission issued permits last week for four new wells in Texas, 71 less than were authorized the week before. The unusually sharp decline was caused, no doubt, by records being held up in district offices as a result of the holidays, and because of changes in personnel.

Two permits were granted for wells in Gregg County in the East Texas field, while one permit was authorized in Harris County, Gulf Coast District, and one in Eastland County, West Central Texas.

North Texas

Archer County Tests Fail To Link Deep Pay Areas

Two northeastern Archer County semi-wildcats on a strike between the Vogtsberger and Asylum pools failed to provide the production connecting link in the deep pay, as generally anticipated, and both will be plugged back to test oil saturation passed up in the Upper Strawn. W. B. Omohundro et al's Browning 1, 2/3 mile northwest of the Vogtsberger 4700-foot pay, developed salt water from Bend at 5133-47 feet with 5½-inch pipe at 5137 feet. Pipe will be perforated opposite saturation passed up at 4060-85 feet, and possibly at 4704-24 feet. Gibson & O'Donohoe's Jentsch 1 prepared to recement pipe at 4260 feet to test broken sand at 4182-4204 feet by perforating opposite saturated zones. The Vogtsberger pay was missed in drilling to 4806 feet, while the Bend was not considered a prospect. Gant & Feagin's Curry 1, 1¾ miles southeast of production, had moved in machine to drill plugs from pipe at 5370 feet and test streaks of saturation in Ellenburger at 5370-91 feet.

Archer County deep prospecting accounted for an Ordovician failure, and another appeared doubtful. W. B. Omohundro et al's Coleman 1, a mile north of Scotland, logged top of Bend at 5279 feet and first Ellenburger at 5918 feet, then halted at 5959 feet. King Oil Company's Taylor 1, 2½ miles southwest of the Hull-Silk field and on a strike with the Mankins pool, was drilling at 4900 feet on a 5000-foot depth contract. Bend section, topped at 4682 feet, carried oil stain and odor at intervals, but lacked sufficient porosity to produce.

The Hapgood pool, eastern Clay County, has been localized due to poor showing of south and east outposts and the recent completion of a failure as a west offset to the discovery. E. C. Norwood and King Oil Company's Hapgood 3, 1260 feet east of a natural flowing well, tested 500 feet of oil and 4000 feet of water in hole after trying to kick off with input gas from conglomerate at 6021-33 feet in Bend, topped at 5015 feet, or 37 feet low. R. C. Lipscomb et al's Hapgood 1 flowed 67 barrels oil and 40 barrels water through ¾-inch choke on 8-hour gauge after plugging back from 6103 to 6093½ feet. Production is from conglomerate at 6077-93 feet in Bend, topped at 5943 feet, or 18 feet low. W. H. Gant et al's Stine 1, Clay County outpost for the Ringgold pool, logged 213-foot section of Bend before entering Ellenberger at 5787 feet, and developed fishing job at 5807 feet. Gulf Oil Corporation's Worsham 3, south edge of the Ringgold pool, was due to plug back from 5850 feet, where swabbing test yielded 58 barrels of 40.5-gravity oil and 43 barrels water daily.

Western Clay Wildcats

Two semi-wildcats are pending in western Clay County. M. M. Cherry, Jr., and Robert Smith contracted to drill Howard 1, northeast corner of Block 45, J. T. Belcher Survey, ½ mile southwest of Horton-Wiggins and Phillips Petroleum Company's Bend-lime discovery. L. T. Burns et al made location for Southerland 1, NEc W½ Block 63, ¾ mile northeast of Strawn production in the Burns-Browning pool.

Exploratory tests in the Fort Worth Basin recorded disappointing results, although negotiations are under way to deepen some of the projects. In the Saginaw area, Tarrant County, Bruce Sullivan, Hill et al's Putman 1, fulfilled depth contract in drilling to 6501 feet, and was awaiting orders. Manahan Oil Company's Collier 1, northeastern Wise County, halted at 6045 feet, with top of Bend tentatively set at 5330 feet. Britt Cranfill & Rodgers' McKay 1, northwestern Wise County, was drilling at 7040 feet, having logged top of Mississippian at 6835 feet with nominal oil odor and stain at 6875-80 feet. Amon Carter et al's Allen 1, Denton County wildcat, was drilling at 7720 feet.

West expansion for the K-M-A field is indicated by King Oil Company's Ancell 1, northeast corner of L. C. Gibbs Survey, A-390, with oil saturation in Strawn sand at 3600-03 feet. Seven-inch pipe has been run for a production test. It is located a mile southwest of Geo. W. Cooper et al's W. T. Waggoner 33-C, semi-wildcat that flowed 48 barrels of 41-gravity oil through ¼-inch choke on 3-hour gauge after acidizing lime at 3630-48 feet for completion last July. Magnolia Petroleum Company's Min Thom 4, third Ellenberger oil well for the field, pumped 42 barrels oil and 55 barrels water from dolomite at 4398-4494 feet. The oil level did not increase in deepening from 4427 feet, where operations were temporarily halted for nitro shot and acid treatment.

Big Six Oil Company's Morris 1, northeastern Wilbarger County wildcat strike made early in December from Cisco sand at 2895-2907 feet, has run tubing for proration gauge. The well recently flowed oil by heads after being shut in for a period. Consolidated Oil Company's Pollan 1, located on a geophysical prospect 4 miles north of Tolbert, was abandoned at 4575 feet. Small show of oil saturation was logged in lime at 4248-55 feet.

Southwest Texas

Testing Series of Oil Shows In Jackson County Wildcat

Humble Oil & Refining Company will test the Marginulina zone in its well on the White League prospect in Jackson County, where several previous wells had indications. The company's Egg 1 was plugged back from 8258 feet and casing landed at 5326 feet for a series of perforation tests. Sand with oil odor was found at 5259-63 feet, again at 5267-68 feet, 5276-80 feet and 5286-92 feet. Marginulina was found at 5178 feet and Frio at 5377 feet. The latter formation provided only water.

Final gauge was scheduled for McSpadden Company's Archie Clark 1, discovery of the Coloma Creek field, nine miles south of Port Lavaca in Calhoun County. The well, drilled under contract by Tideman & Franklin, was carried to 6240 feet, but was finished through perforations at 5890-92 feet. On preliminary gauges, it flowed 2 barrels of 40-gravity oil per hour through 3/32-inch choke under 2050 pounds tubing and 2200 pounds casing pressures. The well is located in the Thomas Henesee Survey and is on a Coronado Corporation farmout.

On the same trend, south flank production to the McFadden field is being developed in Refugio County by a series of 5690-foot Frio sand producers. Barnsdall Oil Company's Marberry 4, 2569 feet west of the nearest well, flowed 124.29 barrels of oil per day through ⅛-inch choke after casing was perforated at 5621-33 feet. The gauge was through ⅛-inch choke, pressures being 375 pounds on tubing and 950 pounds on casing. Two more wells have started in this sector of the field.

S. E. W. Oil Corporation et al's Pfluger 2, one mile south of the Agua Dulce field production in Nueces County, flowed 110 barrels of 56-gravity brown distillate through ¼-inch choke after perforations were made in a new sand at 6997-7012 feet. Flow was under 2300 pounds tubing and 2350 pounds casing pressures, with a large volume of gas.

La Gloria field of Jim Wells County was assured a 5910-foot east extension with completion under way in sand at 6618-36 feet in La Gloria Operators Committee's Alby 1. The test is the first of a series of wells to be drilled in connection with the development of distillate production for a recycling plant.

[*Continued on page 70*]

Texas Gulf Coast

New Sand at Fannett Provides 215-Barrel Well

Gulf Oil Corporation scored its second new sand success at Fannett, Jefferson County, within a year, completing Thomas 21-E, on the northeast flank, for 215 barrels fo 30.8-gravity oil daily, with a small amount of water, through 92 perforations at 5570-90 feet. Tubing pressure was 175 pounds, casing pressure 200 pounds, choke ¼-inch. Last January the company opened an 8275-8285-foot northwest flank Frio sand that gauged 845 barrels of 36-gravity oil daily on initial potential to rank as the outstanding new-sand discovery in the upper Texas Coast in 1940, adding 4,200,000 barrels to the estimated reserve. The latest sand is the fifth Lower Oligocene level, other horizons being two in the Middle Oligocene, and one in the Miocene. The company's Marrs McLean 4-E, deep test on the northwest flank, was drilling at 8150 feet.

The Texas Company demonstrated the possible size of the Blessing structure, Matagorda County, and confirmed the field with Tyson Unit 1, 4750 feet northeast of Pierce 1, the discovery. Potential was 125 barrels of 56-gravity distillate and 4,000,000 feet of gas daily via ¼-inch choke, from Frio sands at 8275-8310 feet. Tubing pressure was 2850 pounds, casing pressure 2700 pounds. Perforations were only 10 feet lower than those in the discovery, and potential was better. The field, one of 1940's seven distillate strikes in the sector, was said to be in line for a recycling plant. The company's Hammond Unit 1, H&GN Survey, 4750 feet southeast of the discovery, was drilling at 7400 feet. Cities Service Oil Company had derrick up for Duffy 1, in Block "A" of J. W. E. Wallace Survey, 3 miles north of The Texas Company's production.

Phillips Petroleum Company continued to test a new sand at Chocolate Bayou, Brazoria County. Houston Farms Development Company 1, 1½ miles west of production, made 103 barrels of distillate in 12 hours on ¼-inch choke, with tubing pressure 3150 pounds, casing pressure 3200 pounds, from 12 perforations at 9675-77 feet. After installation of heater and back-pressure equipment on the separator, the well made 25 barrels of distillate in 15 hours through 7/16-inch choke. The company's Triangle Development Company 1, a mile east of production, was still preparing to side-track around drill pipe stuck at 11,519 feet, with top of cement at 9460 feet. Glenn McCarthy located Carr 1, J. Valderas Survey, 1300 feet southwest of production at Angleton, another Brazoria County deep distillate area.

Rowan North Limit Indicated

At Rowan, Brazoria County, Humble Oil & Refining Company appeared to have pegged the north edge of the field, as Hubbard 3 drilled to 9400 feet with no successful tests. Drill-stem test at 8940-50 feet recovered 30 feet of gas-cut mud in 20 minutes, while a previous test in the regular pay at 8555 feet recovered only gas-cut mud. The 8950-foot horizon produces only in Rowan & Nichols and Texas Gulf Producing Company's Bradbury 1, while the 8500-foot level has yielded several excellent completions. Other than these two levels, no production possibilities have been revealed by the eight completions.

Strake Petroleum Company's Griffith 1, Cayce Survey, Brazoria County, was drilling at 9290 feet after topping Marginulina at 9130 feet. This wildcat, three miles southwest of Alta Loma, Galveston County, attempted to blow out from high in the Heterostegina, topped about 8000-8100 feet, last week, and still shows that tendency. Top of the Marginulina was 700 feet lower than in the Hulen wells at Alta Loma, which would put the Alta Loma Frio well below the Griffith 1 contract depth of 9500 feet. As the test is on the down-dip down-thrown side of a fault, it is believed the operators will take the test to at least 9800 feet.

H. C. Cockburn was completing a deal with O. F. Knisely, New Orleans operator, for development of Cockburn's 4600 acres at East Bernard, Wharton County 1940 gas-distillate discovery. While all of the plans were not available, it is reported that a recycling plant will be built and at least three wells drilled in the next year. The discovery, Leveridge Estate 1, J. Scott Survey, was completed in May for 100 barrels of 55-gravity distillate from 8074-89 feet. The gas is now being sold for domestic purposes in the town of East Bernard.

Pan American Production Company abandoned Koontz 1, HT&B Survey, 1½ miles east of the south end of Damon Mound production, Brazoria County, at 6499 feet. No shows were encountered. L. U. Rountree staked Green's Bayou Homesites Company 1, in the C. S. Hiroms Survey, Green's Bayou prospect, Harris County, for a proposed 3000-foot test. O. C. Garvey dug pits for Horn 1, Jno. Sadler Survey, Montgomery County, a proposed 7000-foot test. Sun Oil Company made roadway for Foster Lumber Company 1, Amasa Turner Survey, 6 miles northeast of the Humble field, Harris County, a 7500-foot test of the company's 7500-acre block.

Louisiana Gulf Coast

Gas-Distillate Strike Indicated At Lowry, Cameron Parish

A gas-distillate strike on the Lowry, or Lakside prospect of Cameron Parish, northwest of Grand Lake, was indicated as electrolog run in Lisbon-Iberia Oil Company's Calcasieu National Bank 1, wildcat in Section 19-12s-4w, first test of the prospect, revealed seven gas-distillate sands with good possibilities. The better sands occurred at 6190-6200, 8730-45, 9220-30, 9520-60, 9795-9845 and 9,975-10,045 feet. The test was standing cemented with 6-inch casing landed at 10,215 feet, with first test to be made in the lower sands.

At Gueydan, Vermilion Parish, Fohs Oil Company set 7-inch casing at 9785 feet in Mulvey Irrigation Company 2, south flank test which is expected to open the first flank production and first distillate output for the 8-year-old field. The company's Mulvey Irrigation Company 1, 640 feet northwest, opened a gas sand in November, 1940, making a few barrels of distillate also, from 9248-54 feet.

Many confirmation tests and flank attempts were delayed by mechanical difficulties. At Edgerley, Calcasieu Parish, Gulf Refining Company and Texas Progress Oil Company's Miller 1, southeast flank test which blew out from 7550 feet a few weeks ago to indicate first deep production for the 28-year-old field, was still cutting and pulling drill pipe. About 1400 feet of pipe remained in the hole. The test, which blew a considerable quantity of oil, is in Section 27-9s-11w. At West Hackberry, Cameron Parish, Stanolind Oil & Gas Company plugged School Board 23-B, Section 16-12s-10w, from bottom at 10,631 feet, to 9680 feet to side-track stuck drill pipe. This is the deepest test for the field.

In the Schooner Bayou (East White Lake) field of Vermilion Parish, an unconfirmed discovery, Union Oil Company of California, was waiting on cement after running 7-inch casing to 11,000 feet in School Board 1-B, east offset to White Heirs 1, discovery. The company's Louisiana Land & Fur Company 4-A, Section 16-15s-1e, was drilling past 8200 feet in side-tracked hole. The discovery was completed for 230 barrels of 32-gravity oil daily from 10,536-542 feet, and was the company's first test in Louisiana.

Cancels Lease Near Bridge

The state introduced a new aspect to development of the Westwego area, across the river from New Orleans, by canceling a 55-acre lease taken by Shell Oil Company on Public Belt Railroad Commission Land near the approach to the Huey P. Long bridge. Companies insuring the huge structure, and the Southern Pacific Railroad, protested because of hazards to the bridge. The potential discovery for the field, Titanic Oil Company's Marrero Land Company 1, on Shell Oil Company farmout acreage, was drilling past 9000 feet in side-tracked hole. Production is regarded as a certainty since the test blew out from 9843 feet, making 35.1-gravity oil under 3500 pounds pressure. Based on flow through drill pipe, which stuck to force a side-tracking job, potential will be in excess of 450 barrels daily. The area has experienced a play since the blowout, Reese Carter staking Fee 1, Section 3-13s-23e, ¼ mile east of Marrero 1, and Phillips Petroleum Company et al taking up acreage, which is spread among that company, Shell Oil Company, Gulf Refining Company, Stanolind Oil & Gas Company and independents. Much drilling is forecast if the Marrero test comes up to expectations and development does not veer toward the foot of the bridge.

The Texas Company proved West Cote Blanche Bay field to be a salt dome, and opened a fourth sand for the field by

drilling State-West Cote Blanche 6 into salt at 7820 feet before plugging back to perforate at 7640-50 feet. Flow was 277 barrels of 32.1-gravity oil daily through 10/64-inch choke, with working pressure 1000 pounds. Each test in this St. Mary Parish 1940 discovery has opened a new horizon, the discovery producing 23-gravity oil from 3109-36 feet; State 2 gauging 235 barrels of 29-gravity oil daily from 4997-5019 feet, and State 3 opening a 9000-foot level. Last completion constitutes a ¼-mile west extension. The company will drill a wildcat on West Cote Blanche Island.

Flank exploration at Jennings, Acadia Parish, progressed without interruption. Shell Oil Company's Conover-Community 13, southeast flank, Section 40-9s-2e, was drilling past 7690 feet. Stanolind Oil & Gas Company's Crowley Oil & Mining Company 119, southwest flank test in Section 48-9s-2w, was coring sand at 8445 feet. Tide Water Associated Oil Company entered the West Bay area, opened a few weeks ago by Gulf Refining Company, with location for State 1-451, in Section 26-22s-30e, Plaquemines Parish. The discovery, Timolat 1-B, made 456 barrels of 31.8-gravity oil daily from 7267-85 feet, via 3/16-inch choke, under 1350 pounds pressure. Discovery location was in Section 36-22s-30e.

H. C. Cockburn temporarily abandoned Gianelloni Estate 1, Section 58-8s-1e, at 8900 feet after taking side-wall cores and running electrolog in this West Baton Rouge Parish test. F. K. Campbell reentered Darby 1, wildcat at Spanish Lake, Iberia Parish, Section 56-11s-6e, previously quit at 8020 feet and deepened to 9000 feet, where electrolog was run. There is a possibility the well will be carried 1000 or 2000 feet deeper.

Southeastern States

Tinsley Dome Southeast Test Shows Some Promise

The southeast development at Tinsley Dome, Yazoo County, Mississippi, showed additional promise last week when Union Producing Company's Florence Harris 3, NW 30-10n-2w, cored oil saturation in sand and lime in the Woodruff horizon from 4908 to 4982 feet; elevation is 324 feet. Drilling and coring continued to 5031 feet in limy shale where casing was set.

Union Producing Company, which completed two wells during the week at Tinsley Dome, also appeared assured of another producer in the southern part of the field at Perry 8, SW 24-10n-3w, which logged Woodruff saturation from 4583 to 4613 feet; elevation is 224 feet.

A Bolivar County wildcat was abandoned at Ed S. Holman's Elizabeth Thomas 1, NE NE 18-24n-7w, at 4664 feet, after a 20-minute drill-stem test, with packer set at 1776 feet, showed only a little gas and 90 feet of drilling mud.

Allied Pipe Line Company is laying a four-inch oil line from E. C. Johnston's Robertson 1, Section 20-10n-2w, in the southeast part of the Tinsley Dome field, to loading rack at Anding.

Deepest drilling operation at present in Mississippi is Fohs Oil Company's Batson-Hatten 1, SE 10-1s-12w, Forrest County, a wildcat, drilling hard shale at 7240 feet.

North Louisiana

DeSoto Parish Gasser Area's Largest in Several Years

Glen Rose lime wet gas production in the Logansport-Joaquin field, located partly in Shelby County, Texas, and partly in DeSoto Parish, Louisiana, was extended approximately two miles east last week when Southern Production Company's Gannon-Frost Unit 1, NEc 12-11n-16w, was completed at 4975 feet, gauging at first 75 million cubic feet of gas daily. Casing was perforated at several sections in the Glen Rose lime between 4820 and 4920 feet. A later gauge showed an estimated daily open flow gas potential of 177 million cubic feet of gas daily, the largest gas well completed in recent years in North Louisiana. Across the Sabine River in Texas, in the same field, Union Producing Company last fall completed a 144 million-foot gasser in the Glen Rose.

Southern Producing Company in recent months acquired large holdings around the Logansport-Joaquin field, in both Louisiana and Texas, and is drilling two other tests at present. It is a subsidiary of Southern Natural Gas Company of Birmingham, Alabama, which already has been studying plans for a gas line from this field to Monroe, Louisiana, to link with its trunk from that point to several southeastern cities, including Birmingham and Atlanta.

N. & W. Corporation immediately made location for a test southeast of the new gas well at Sloan 1, NWc NW 18-11n-15w.

L. M. Calhoun and associates of Natchez, Mississippi, have taken a 5200-acre wildcat block north of the Bethany gas field in Caddo Parish, Louisiana, and Panola County, Texas, centering around Section 8-16n-16w, for a Travis Peak test. A geophysical unit recently worked the area.

The leasing and geophysical campaign along the Angelina-Caldwell Flexure across North Louisiana continued unabated. Negotiations are under way between Louark Producing Company and H. L. Hunt, whereby the latter would acquire some of the recently acquired holdings of Louark Producing Company in this trend in exchange for some of Hunt's oil-producing properties in South Arkansas. Hunt also has been among the first to lease and drill widely in the North Louisiana trend and discovered the shallow Wilcox oil fields in LaSalle Parish at both Olla and Nebo (Jena).

Possibility of getting oil production in the Glen Rose lime in the Dubberly field, Webster Parish, was seen in L. M. Moffitt's and R. W. Perritt's Kennon 1, SW SE 35-18n-9w, which logged 40 feet of lime showing oil stains and cemented casing at 5822 feet. Salt water appeared in the lower part of the saturated horizon but operators planned to

Nobody Ever Asks;
Will Anybody Listen?

Have you ever heard an oil man inquire, or have you ever heard of an oil man who did inquire, into the training, experience and all-around qualifications of a supply man? Nevertheless we are glad that ours is an organization of post-graduates, for while the oil man may be less curious about his supply man than he is about his physician, his sixth sense for values in both merchandise and service has kept us growing for thirty-two years.

PELICAN WELL TOOL & SUPPLY CO.

SHREVEPORT
LOUISIANA

PELCO

Houston
Berwick
Houma
New Iberia
Magnolia

perforate in the upper part of the horizon. The Dubberly field has produced only gas/distillate in the Glen Rose.

Union Producing Company's Smackover lime deep test, Meadows A-1, C NE 18-21n-4w, Claiborne Parish, two miles north of Lisbon, drilled hard lime at 10,543 feet.

Arkansas

Columbia Test Shows Oil in Travis Peak, Deepening

A showing of oil in the Travis Peak, which later tested only drilling mud and salt water, was logged in Turner & O'Farrell's Smart 1, SW SW 12-15-20, Columbia County, near the old shallow Stephens field, discovered 20 years ago. The test, projected as a Smackover-lime deep operation, topped Travis Peak sand at 3416 feet, and drilled 4 feet before a 20-foot core was cut to 3440 feet, with 16 feet recovery, top 10 feet showing pin points of oil and the rest salt water. In a 15-minute drill-stem test, however, the hole showed 2600 feet of mud and salt water, with no pressure built up. Drilling will continue to 6000 feet or the Smackover lime, and if no better showings are logged, hole will be plugged back and casing cemented for a test of the Travis Peak, which would be a new producing horizon in South Arkansas.

On the east edge of production at Magnolia, Columbia County, Louark Producing Company's D. E. Booth B-1, NW NE 20-17-19, one location east of present production, cemented 6-inch casing at 7488 feet, and made location for an offset, D. E. Booth C-1, NE NE 20-17-19. The present test, with elevation of 247 feet, topped Buckner at 7328 feet; Smackover lime at 7436 feet; Reynolds lime at 7445 feet, and porosity at 7489 feet.

Inactive since last July 28, the Atlanta field, Columbia County, secured a new location when G. Scott Hammonds started rigging for Goode 1, SE NW 16-18-19, on the west edge of the field, which has been defined in practically all directions. Three tests are rigging at McKamie, LaFayette County. One test is drilling and one is shut down due to high water in the Dorcheat field, Columbia County. This list includes all active operations in deep South Arkansas fields.

A 6821-foot Smackover lime test in the old shallow Lisbon field, Union County, was abandoned at E. G. Bradham's A. E. Slaughter 1, SE SE 9-17-16.

Arkansas Permits

Five drilling permits were issued last week by the Arkansas Oil & Gas Commission, as follows: Columbia County—H. Crow, W. C. O'Farrell and A. B. Turner's J. W. Smart 1, C SW SW 12-15-20; LaFayette County—Barnsdall Oil Company's R. R. Cornelius 1, C SW NW 28-17-23; Ouachita County—Berry Asphalt Company's G. S. Martin 1, SW NE SW 17-14-19; Sevier County—Gramp Oil Company's Floyd Phillips 2, SW 26-9-30; Union County—McCresslenn Oil Company's K. D. Parker 2, SW NE SE 3-18-13.

Michigan

Ottawa County Field Well Flows Heavily From Traverse

Completion of the first gusher-type well in the West Tallmadge-Georgetown area of Ottawa County, where 10- to 50-barrel wells out of 26 completions have been average, promised to revive shallow drilling in the Grand Rapids District. Smith Petroleum Corporation's Visser 4, NW SW NW 34-7n-13w, flowed wild for 10 hours at an estimated rate of 350 barrels per hour. Once brought under control, it flowed as high as 214 barrels per hour, choked at the mastergate. Production is from Traverse lime, topped at 1789 feet and bottomed at 1891 feet. Six new locations were staked as operators attempted to figure whether Visser 4 was a freak or the forerunner to better days.

Sun Oil Company was making an attempt to carry McIntosh 1, C S½ SW NE 16-19n-3w, Clare County, deeper for a test of the Monroe. Dundee, original objective, was logged at 3818 feet, and drilling halted at 3963 feet, originally for abandonment. If hole can be reamed from 3818 feet and casing set, it will be carried deeper.

Delayed by a muddy lease site that forced building a plank foundation and 400 feet of plank road, Gulf Refining Company succeeded in getting a new rotary rig on location this week and started to rig up Bateson 1, Section 2-14n-4e, Bay County deep oil-gas well. Company reported that high-gravity oil, being produced from an unclassified formation at 7776 feet, has been comparatively steady with recovery of 45 to 86 barrels per day, depending on chokes and back-pressures which have been alternated for test purposes. Test is scheduled to be carried to 9000 feet or more if drill pipe, still in the hole from prior to a fire on December 5, can be recovered.

California

Greeley Outpost Apparently Running Too High

On the northeastern flank of the Greeley field in Kern County, Standard Oil Company's KCL 11-25, outpost in Section 17-29-26 has encountered the base of the Grit zone at 11,599 feet, with sandy siltstone cored to 11,612 feet and sandstone showing oil in fractures is now being cored at 11,622 feet. The well is running some 260 feet lower than expected and reports indicate does not look encouraging.

In the Union Avenue area of Kern County, Hancock Oil Company's Roberts 1 wildcat, Section 6-30-28, encountered mostly gray sand and wet sand from 5300 feet to 5559 feet, where it is bottomed. Several oil sand bodies were cored between 4085 and 5300 feet. It has plugged back to 5312 feet and water string cemented on top of the plug preparatory to perforating above shoe and testing by stages.

Adjacent to the recently completed Lincoln 2 well of R. E. Havenstrite in the Del Valle field in Los Angeles County, Universal Consolidated Oil Company has staked location for Dennis 1 in Section 21-4-17, a semi-wildcat. Lincoln 2 was completed by Havenstrite flowing at an initial rate of 3400 barrels daily, 32-gravity oil and has been progressively beaned back to 600 barrels daily, the current rate of flow. Operator has staked tentative location for Vasquez 1 in the proven area of the field. Approximately four miles northwest of Del Valle, Western Gulf Oil Company is drilling at 950 feet in Lechler 1, on a separate structure.

Standard Oil Company, The Texas Company and Amerada Petroleum Corporation are among companies currently active in leasing in the Sacramento Valley area preparatory to exploratory drilling for gas. Standard Oil Company is expected to drill a 700-acre lease secured on Grizzly Island in the Sacramento River early next summer. Richfield Oil Corporation is drilling at 3683 feet in Potrero Hills 3, gas test in Section 10-4-1, Solano County, not far from Suisun Bay. Formation test on interval 3590 to 3662 feet showed a light blow of gas with recovery consisting of 20 stands of gas-cut mud.

Currently three unusually deep tests are in process of drilling in the Los Angeles Basin. These include a test by Standard Oil Company at Inglewood which is down some 9000 feet; a test by Union Oil Company on its Callender property at Dominguez, down below 11,800 feet; and a second deep try by the latter company on its Community lease at Long Beach, now drilling below 10,500 feet, the deepest test yet drilled in that area. Deepest well drilled heretofore at Long Beach was by Dormax Oil Company to 10,450 feet.

Rocky Mountain Area

Colorado Field to Get Development After 3 Years

In the Powder Wash field in Moffat County, Colorado, Mountain Fuel Supply Company is getting underway in Musser 2-A, CW NW SW 4-11n-97w. Three years ago the Powder Wash field made Colorado's most important discovery with 60-barrel-per-hour completion in the Wasatch formation of the Eocene at 5014-5032 feet. The discovery was of particular importance, because it was the first strike of oil definitely of Tertiary placements in the Rocky Mountain states. Because of distance to market and lack of outlets the field has seen little development. However, in 1941, since completion of the trans-Wyoming pipe line to Salt Lake City, it is believed that Powder Wash will see an active year with opening up of markets for the field. Oil from Powder Wash is 39.9 degree gravity, but is of exceptionally high wax content, congealing at 50° F., making the crude difficult to transport, a factor in delaying development of the field.

In the semi-wildcat Ojo area of Huerfano County, Colorado, Tomkins & Son's Two Pines 1, SE SE 31-28s-69w, showed for 10 barrels daily on the pump from 369 feet. It is expected that the district will see the drilling of a number of shallow wells through the year.

UNITED STATES WELL COMPLETIONS

Company, Well and Location	Init. Prod. Bbls.	Depth
Arkansas		
Union County (Rainbow City-Champagnolle)—		
Stacey & Erwin, Grace 5, 31-17-14.	100	3702
Union County (Smackover)—		
Bob Milam, Childs 1, 8-16-16.....	115	3134
Union County (Wildcat)—		
E. G. Bradham et al, Slaughter 1, 9-17-16	*	6821
Union County (El Dorado)—		
C. H. Murphy, Jr., Cates B-2, 33-18-15	*	2142
California		
Fresno County (Coalinga Northeast)—		
Bandini Pet. Co., No. 71-30B.....	192	8256
Fresno County (Coalinga Eocene)—		
Robert S. Lytle, 1-20F	314	8158
Superior, Cagle B-6 1308		8241
Universal Cons., Binkley 4 1600		7825
Fresno County (Kettleman North Dome)—		
KNDA, No. 83-34J	240	8800
Kern County (Belridge)—		
Belridge Oil Co., No. 63-35.....	261	8447
Continental, Result 10	252	8339
Kern County (Lost Hills)—		
Argo Pet. Corp., Farnsworth 1A....	22	1332
Kern County (Rio Bravo)—		
Union, Kernco 36-34	720	11,444
Kern County (Ten Sections)—		
Shell, KCL A-43-29 1583		8235
Los Angeles County (DelValle)—		
R. E. Havenstrite, Lincoln 2.....3300		6221
Los Angeles County (Dominguez)—		
Union, Austin 6	295	7548
Carson 15	82	8536
Los Angeles County (Inglewood)—		
Kettleman & Inglewood Corp., Rubel 27	881	3270
Los Angeles County (Newhall-Potrero)—		
Barnsdall, RSF 15	814	7423
Los Angeles County (Rosecrans-Athens)—		
Royalty Service Corp., A-W-4	200	8000
Los Angeles County (Wilmington)—		
Leslie Madison, Kern 3 .....No Est.		3715
Seashore Oil Co., Gremac 10	210	3635
Union Pacific, UP 166 .....No Est.		2941
Sacramento County (Northern California)—		
Independent Explor. Co., Unit Plan 1	*	4808
Santa Barbara County (Santa Maria Valley)—		
Union, Morrison 3	764	5125
Le Roy 6	123	5306
Ventura County (Rincon)—		
C.C.M.O. Co., Hobson B-39	405	5132
Ventura County (San Miguelito)—		
Continental, Grubb 20 1618		6895
Illinois		
Bond County—		
W. S. Cochrane, Hoing 9, ne se nw nw 16-4n-4w	130	434
Clay County—		
Pure, Mosely 3, c e½ se ne 4-2n-8e	34	3010
Hosselton 1, c e½ ne sw 21-2n-8e	36	2655
Clinton County—		
Williams, Ellerman 2, nw ne sw ne 1-1n-1w	9	1341
Shell, Criley 22, sw nw ne 2-1n-1w	76	1376
Adams Oil, Copple 28, nwc se sw 35-2n-1w	20	1371
Crawford County—		
Babler et al, Mitchell 1, s½ nw nw 21-6n-13w	*	2987
Edwards County—		
Continental Oil, Cowling 1, ne ne ne 13-2s-10e	*	3260
Stafford 3, sw se ne 13-2s-10e...	35	3150
Superior, Melvin Works 3, nw sw nw 18-2s-11e	854	3173
Effingham County—		
R. E. Troupe, Martin 1, sw sw ne ne 22-6n-5e	*	2586
Fayette County—		
Kingwood, Dayton 1, e½ nw se 14-6n-1w	*	2946
Texas, Eldridge 3, c nw ne ne 6-6n-3e	36	1590
Sell 2, se se se 7-6n-3e.....	*	1616
Zephyr Dr. Co., Stevens 7, nw se nw se 31-6n-3e.....	75	1628
Mudge Oil, Devore 4, ne se ne se 1-7n-2e	47	1478
Carter, Durbin 5, w½ nw ne 4-7n-3e	60	1589
Shaw 3, nw sw ne 17-7n-3e.....	36	1548
Wood-Tipsword 2, ne se ne 13-8n-3e	180	1501
Purtilar 1, sw nw sw 24-8n-3e....	*	1477
Luttrell, Bail 1, ne sw se 16-7n-3e	36	1548
Magnolia, Clow 8, swc se sw 32-8n-3e	486	1523
Clow 34, nw ne se nw 5-7n-3e....	361	1489
Clow 33, ne nw se nw 5-7n-3e....	196	1492
Clow 32, nw nw ne 5-7n-3e.....	524	1536
Clow 31, sw sw ne 5-7n-3e.....	176	1525
Clow 28, ne se sw ne 5-7n-3e....	222	1554
Franklin County—		
Hook & Ring, Marvel 1, se ne ne 34-7s-4e	15	3121
Hamilton County—		
Carter, Friel 2, ne sw se 27-5s-6e...	203	2959
Shell, Porter 5, se sw se 34-5s-6e..	260	2955
Porter 6, nw sw se 34-5s-6e.....	192	2963
Porter 7, ne se se 34-5s-6e.....	101	2952
Ohio, Grimes 2, sw nw nw 2-6s-6e	133	2959
Matheny 1, nw nw se 3-6s-6e....	556	2985
Hood 2, nw nw ne 3-6s-6e.....	450	2960
Texas, Edwards 5, c se ne ne 3-6s-6e	138	2946
Cameron, Brill 1, sw se ne 6-6s-7e	40	2732
Jasper County—		
Lain O&G, Henry 2, nw nw sw 17-6n-10e	170	2892
Nu-Oil, Inc., Acklin Hrs. 1, nw se nw 17-6n-10e	*	2940
Pure, Boos Cons. 2, c w½ se sw 28-6n-10e	8	2845
Kermicle 1, c w½ se se 32-6n-10e.1601		2800
Mattingly 1, e½ nw ne 5-5n-10e 539		2785
Aldridge 3, w½ se sw 8-5n-10e...1214		2835
Aldridge 4, w½ ne nw 17-5n-10e. 896		2820
Dickerson 2, sw nw 17-5n-10e....1276		2821
Musgrove 1, c w½ nw se 20-5n-10e 1004		2820
Jefferson County—		
Milo Siegel, Roper 1, nw ne ne se 9-1s-13	*	2044
Nash Redwine, Cameron 1, nw nw ne 16-1s-2e	124	1946
Lawrence County—		
Kentucky Nat'l & Parriott, Bierhaus 4, s½ nw se 13-4n-11w.....¶28.86		1090
Macon County—		
J. H. Williams, Kater 1, sw se nw 17-15n-2e	*	2333
Marion County—		
Texas, Centralia 87, sec ne 5-1n-2e	275	3495
Southwester O&G, Stein 13, se sw se 5-2n-1e	75	2946
Shell, Ververs 7, se nw nw 18-3n-1e.	250	1436
Adams, Ingels 3, ne sw ne 28-4n-1e	*	1455
Monroe County—		
Regent Oil Co., Gummershimer 6, nwc se nw 2-2s-10w.....	20	473

[*Continued on next page*]

*Failures; †Junked; ¶Million cu. ft. gas.

Summary of Drilling Operations in the United States, Week Ended January 11, 1941

	WELLS COMPLETED							PERMITS FOR NEW WELLS*				
	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1941	Total this Date 1940	This Week	Total this Month	Total 1941	Total this Date 1940	Year Total 1940
Alabama	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arkansas	4	2	.....	2	215	6	14	5	6	6	3	153
California	24	23	.....	1	15,184	47	50	15	27	27	51	1,102
Colorado	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Illinois*	60	49	.....	11	11,293	119	205	55	145	145	202	4,532
Indiana	7	4	1	2	671	14	28	.....	.....	.....	.....	.....
Kansas	33	22	1	10	26,391	71	95	26	50	50	64	2,048
Kentucky	.....	.....	.....	.....	.....	6	24	.....	.....	.....	.....	.....
Louisiana	32	21	2	9	5,360	51	93	31	42	42	74	1,658
Michigan	13	5	.....	8	2,010	31	88	9	27	27	82	1,093
Mississippi	4	3	.....	1	2,000	7	8	.....	.....	.....	.....	.....
Missouri	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26
Montana	3	3	.....	.....	150	6	9	.....	.....	.....	.....	.....
Nebraska	3	1	.....	2	618	3	.....	1	1	1	.....	69
New Mexico*	10	10	.....	.....	3,111	15	53	9	16	16	41	559
New York†	8	8	.....	.....	15	16	64	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	24	6	11	7	36	48	73	.....	.....	.....	.....	.....
Oklahoma	39	22	2	15	7,516	81	96	33	66	66	88	1,888
Pennsylvania†	44	32	10	2	32	70	205	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....
Texas	151	117	3	31	107,446	235	582	4	79	79	563	11,170
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	15	1	12	2	3	29	43	.....	.....	.....	.....	603‡
Wyoming	4	1	1	2	70	4	9	.....	.....	.....	16	1
Total this week	478	330	43	105	182,121	859	1,745	188	459	459	1,184	24,902
Total last week	381	262	42	77	152,518	381	1,113	271	271	271	652	24,902
Total this year	859	592	85	182	334,639	859	.....	.....	.....	.....	.....	.....

* This tabulation includes those states where weekly data are available; figures for Missouri date from August 10, 1940; Nebraska from August 3, 1940.
† Includes water-input wells. ‡ For first 9 months of 1940.

United States Well Completions—*Continued*

ILLINOIS—Continued

Montgomery County—

Company, Well and Location	Init. Prod. Bbls.	Depth
National Pet. Co., Bost 1, sw sw sw 4-8n-2w	*	1254
Swords & Thompson, Jett 1, ne se se 24-8n-4w	*	950

Richland County—

Dyson & Anderson, Ash 2, nw sw sw nw 18-4n-10e	112	2945
Pure, Sparr 3, se sw sw 24-4n-9e	54	2600
Wachtel 8, c e½ sw sw 6-4n-10e	86	2890
Billings 3, c w½ ne se 31-5n-10e	114	2860
Bur-Kan & Kingwood, Allen 1, c sw nw 27-4n-10e	15	3125

St. Clair County—

Henry Schuster, Fee 1, ne nw se sw 25-2n-8w	*	280

Wabash County—

Bell Bros., Keepes 2, ne nw ne 34-1s-13w	*	2690
D & H Dr. Co., Beall 3, ne se sw nw 11-2s-13w	*	2750
Sam Yingling, Compton 3, ne se sw 19-2s-13w	*	1716
J. J. Broadus, Epler 1, nec ne 31-2s-13w	18	2496
Eppler 2, se se se 31-2s-13w	40	2498

Washington County—

Magnolia, Rahn 6, sw ne sw nw 23-1s-1w	254	3145
McBride, Frieman 1, cse nw nw 29-3s-4w	*	1155
J. L. Murphy, Brammier 1, sw nw ne 29-3s-4w	*	1030

Wayne County—

Pure, Elliott 1, w½ ne sw 1-1n-7e	34	3034
Feller 3, sw ne sw nw 5-1n-8e	300	3083
Flexter 1, e½ se se 35-2n-7e	217	3100
J. V. Dunbar, Finley 1, se sw nw 4-2s-7e	*	3313
Jack Myers, Cornick 2, nw ne sw 4-2s-7e	275	3284
O'Meara, McLin 3, nw se ne 9-2s-7e	240	3273
Texas, Davis 2, c e½ nw nw 10-2s-7e	70	3288
Cornwell et al, Felix 4, w½ se ne 19-3s-8e	*	3372
Ben Nation et al, Painter 2, nwc ne se 19-3s-8e	170	3266
New Penn, McKyes 2, se nw ne se 19-3s-8e	197	3257
H. G. Spiller et al, Gray 1, sec sw ne 19-3s-8e	150	3260

White County—

Herndon Dr., Hon 1, ne sw se 32-3s-14w	100	2774
Garrison Hrs. 1, sw nw ne 8-4s-14w	40	2810
Arrow Dr., Hon 3, se sw sw 33-3s-14w	150	2910
W. W. Gray, Fee 1, c s½ nw ne 31 3s-8e	135	3273
Fee 2, sw sw ne 17-4s-14w	133	2709
Fee 3, se se nw 17-4s-14w	75	2720
Fee 4, ne sw ne 17-4s-14w	133	2719
C. A. French et al, Roy 1, s½ nw nw 3-3s-9e	*	3602
Magnolia, Bond 8, ne ne sw 8-4s-14w	37	2735
Pure, Potter 7, sw nw nw 9-4s-14w	90	2694
Potter, nw nw nw 9-4s-14w	108	2695
Calvin 4, sw nw nw 16-4s-14w	1001	2858
Bell Bros., Skiles 1, nw nw sw 16-4s-14w	140	2725
Cherry & Kidd, Gray 6	175	2711
Walter Duncan, Hughes 2, sw ne sw 17-4s-14w	130	2721
Hughes 2, sw ne se 17-4s-14w	133	2568
Hughes 4, nw se se 17-4s-14w	144	2586
Ryan Oil Co., Bramlett 9, cnw sw se 17-4s-14w	175	2720
Bramlett 4, ne nw se 17-4s-14w	90	2584
Skelly, Daly Tr. 1, ne ne sw 17-4s-14w	36	2725
K. B. Yost et al, Bramlett 3, sw nw se 17-4s-14w	80	2597
Yingling et al, Ford Hrs. 1, c se ne sw 22-4s-14w	45	2618
Superior, Ford 3, sw ne se 27-4s-14w	850	2937
Fitton 8, sw sw sw 23-4s-14w	124	2937
Given et al 6, nw sw sw 34-4s-14w	180	2919
Ford 7, nw se se 27-4s-14w	75	2895
Stanley 2, se se nw 27-4s-14w	91	2925
Ford 1, nw nw ne 34-4s-14w	1159	2952
Sun, Greathouse 20, ne se se 33-4s-14w	146	2726
Tide Water, Dennis 8, nw sw ne 33-4s-14w	203	2733
Dennis 10, se ne ne 33-4s-14w	335	2726
Dennis 12, ne ne ne 33-4s-14w	170	2910
Ben Nation, Dunn 4, nw nw nw 6-4s-8e	152	3249
Exchange, Holderby 2, sw ne ne 11-6s-9e	38	2281
Pearce 13, sw nw nw 12-6s-9e	130	2269
Bowers et al, Storms 3, se ne 22-6s-9e	10	2247
Angle, Storms 2, se nw ne 23-6s-9e	257	2262

Indiana

Dubois County—

A. J. Wise, Haph 1, ne nw ne nw 12-2s-5w	*	755

Gibson County—

Hall Edwards, Maier 19, sw sw ne 14-3s-14w	400	2527
Continental Oil, Bozeman 20, se se ne 32-3s-14w	140	2540
Bozeman 22, ne sw ne 23-3s-14w	240	2866
Green 1, sw sw se 26-3s-14w	*	2942
Keck 10, ne se se 27-3s-14w	175	2600
Mabee O&G, New Harmony Bank 2, se sw nw 27-3s-14w	110	2789

Jasper County—

A. C. Thomas, Connare 1, sw sw sw 1-29n-6w	*	170

Posey County—

Continental Oil, Kleiderer 4, ne c se ne 33-3s-14w	168	2899
C. W. McKeehen, Keck 3, sw nw nw 35-3s-14w	110	2580
W. D. Anderson et al, Faul 1, ne ne se 11-4s-14w	*	3052
Gulf Ref., Meier 5, sw sw ne 7-6s-12w	gas inp.	1180

Spencer County—

W.W. Damron, Wright 5, sw c se sw 20-7s-6w	¶20.76	889

Sullivan County—

A. S. Reed et al, Ogle 2, sw ne ne sw 35-8n-10w	¶0.9	799

Kansas

Barton County—

Derby, Bernsdorf-Jenke 3, nw se ne 33-16-11w	3000	3367
Carlock, Rick 1, c e ½ ne ne 12-19-11w	585	3360

Butler County—

Cities Service, Fee 6, sw ne ne 17-26-5e	180	1658

Cowley County—

McKnab, Land & Power 1, cwl ne nw sw 15-34-3e	*	3352

Ellis County—

Phillips, Bemis 5, nw sw nw 21-11-17w	*	3501
Palmer, Smith 1, c w½ sw nw 13-12-16w	167	3354
Doley, Koblitz 2, c w½ sw nw 23-12-18w	114	3676
Bay, Keys 2, c w½ se sw 1-13-18w	319	3626

Ellsworth County—

Stanolind, Haggy 1, c e½ sw sw 16-16-10w	*	3406
Stoltenberg "B" 1, cw ½ sw se 22-16-10w (pb 3273 ft)	69	3308
Atlantic et al, Sto'tenberg "E" 4, c n½ sw sw 27-16-10w	3000	3287
Skelly, Meyers 2, c n½ sw ne 35-16-10w	3000	3314
Pryor & Lockhart, Strattman 6, c w½ sw nw 1-17-10w	159	3305
Skelly, Smith 1, c s½ se nw 32-17-10w	2412	3244

Grant County—

United Producers, Trusdale 1, sec nw 12-30-35w	¶11.3	2712

Greenwood County—

K. R. H. Oil Co., Jackson 3, swc ne 23-26-9e	20	2212

Ness County—

Aladdin, Jedlicka 1, c ne ne 33-20-23w	*	4873

Pratt County—

Springrose, Steffen 1, cwl sw ne se 24-27-11w (pb 3550 ft)	50	4144
Skelly, Krehbiel "A," c w½ nw ne 25-27-11w	610	3505

Rice County—

McPherson, Grizzell 1, sw se ne 8-19-9w	3000	3246
Cities Service, Apel 1, c e½ ne sw 33-19 9w	*	3253
Colorado, Teppan 1, c w½ sw ne 10-20-9w	403	3240

Rooks County—

Broadview, Livengood "C" 1, c w½ nw ne 11-9-16w	204	3283
Helmerich & Payne, Baumgarten 1, c e½ se nw 25-9-19w	*	3700

Russell County—

Cities Service, Steinlie 1, ne sw nw 36-14-12w	*	3160
Aylward, Rush "East" 2, c e½ se se 30-14-14w	3157	3024
Pryor & Lockhart, Borrell 1, c n½ ne se 3-15-11w	*	3220
Stanolind, Driscoll 1, c n½ sw se 30-15-11w	281	3260
Sinclair Prairie et al, Sellens 2, c w½ nw sw 36-15-13w	306	3360

Saline County—

Shawver et al, Lacquemont 1, c e½ se sw 30-16-1w	*	2738

Stafford County—

Stanolind, Hays 1, c n½ se se 11-24-11w (otd 3763 ft)	3000	3800
Phillips, Tretbar 2, c n½ se nw 12-24-11w (otd 3759 ft)	2355	3781

Sumner County—

Hawkeye, Harder 1, c s½ sw se 7-30-1e	*	3931

North Louisiana

Caddo Parish (Pine Island)—

W. C. Curry, Spell 3, 28-21n-15w	30	1587
Fryman & Liles, Drout 1, 12-20n-16w	30	1509
Renwick & Wickizer, Stiles 3, 17-21n-16w	10	1010
Texas Co., Raines 23, 15-21n-15w	25	1745

De Soto Parish (Joaquin-Logansport)—

Southern Prod. Co., Gannon-Frost Unit 1, 12-11n-16w	¶75.0	4975

La Salle Parish (Olla)—

Arkansas Fuel Oil Co., Randall A-1, 13-10n-2e	*	2370

La Salle Parish (Wildcat)—

Sinclair Prairie, Goodpine 1, 28-9n-3e	*	4515

Tensas Parish (Wildcat)—

H. L. Hunt, Chicago Mill & Lbr. Co. 4, 14-13n-10e	*	4025

Union County (Wildcat)—

Tiki Expl. Co., Jones 1, 30-21n-3w	*	3150

South Louisiana

Anse La Butte—

Stanolind, Bergeron 3	178	4163

Barataria—

California, Flemming 4	303	8787

Bayou Boullion—

Superior, Iowa St. Martin 1-A	¶	7600

Caillou Island—

Texas, State 49	367	7950

Cheneyville—

Amerada, Weil 17	185	5721

Dog Lake—

Texas, LL&E—Dog Lake 13	197	7800

Fausse Point—

Sun, Kling & Walet 9	*	1292

Golden Meadows—

Brown & Woods, Cheramie 2	108	5503
Superfine, Morgan 1	194	3750
McMurray, Collins 3	105	5480
Texas, State 10	106	2836

Iowa—

Barnsdall, Fontenot 4, otd 6929	*	8777

Lake Salvador—

Texas, State 3	637	10,179

Leeville—

Texas, LL&E—Leeville 78	399	8650

North Crowley—

Humble, Williams 9	494	8606

Quarantine Bay—

Gulf, State QQ 24	441	8490

West Hackberry—

Superior, Vincent 11	413	8390

Ville Platte—

J. K. Hughes, Pitre 2	498	10,140

West Cote Blanche—

Texas, State 6	227	7854

West Hackberry—

Superior, Vincent 11	413	8390

Bay St. Elaine—

Jefferson SDRC 7	*	1147

West Baton Rouge Parish—

H. C. Cockburn, Gianelloni 1	*	8960

Calcasieu Parish—

Continental-Burton, Mayo 1, So. Lake Charles	*	10,940

Michigan

Allegan County—

McClanahan Oil Co., Funk 1, sw nw sw 28-4n-12w	*	1690
Union Oil Co., Johnson 1, sw se se 10-4n-13w	50	1596
W. S. Cook, Morgan 1, se se nw 29-1n-13w	120	1353

Gladwin County—

Sun Oil Co., Tope 1, ne se nw 36-17n-2w	20	3859
Stork Oil Co., Connolly 4, c s sw ne 35-17n-2e	*	3569

Gratiot County—

Vic R. Wilson, Probst 1, ne se se 4-10n-2w	*	915

Midland County—

C. L. Maguire, Inc., Crosse 1, nw sw ne 33-16n-2w	*	3850

Ottawa County—

J. W. McIntosh, Remold 1, nw nw ne 34-5n-15w	*	1550
Smith Pet. Co., Visser 4, nw sw nw 34-7n-13w	1800	1790

Van Buren County—

Twin Dr. Co., Tomcala 1, se se se 24-2s-15w	*	1078
John McClean, McConnhole 1, sw se nw 21-2n-6w	20	1006
Frank S. Vahue, Phillips 1, nw nw se 36-1s-14w	*	1330
W. E. Dotson, Lake 1, sw nw se 12-1s-15w	*	1216

Mississippi

Bolivar County (Wildcat)—

Ed S. Holman, Thomas 1, 18-24n-7w	*	4664

Yazoo County (Tinsley Dome)—

E. C. Johnston, Robertson 1, 20-10n-2w	600	5035
Union Prod. Co., Harris 2, 30-10n-2w	950	4981
Perry 7, 24-10n-3w	450	4590

United States Well Completions—*Continued*

Montana

Company, Well and Location	Init. Prod. Bbls.	Depth
Glacier County (Cut Bank)—		
Glacier Prod. Co., Simero 5, cnw se 6-33n-5w	110	2828
State S. sw sw nw 16-35n-5w	25	2905
Toole County (Kevin-Sunburst)—		
Scotland et al, McNamer 4, cnl ne sw 29-35n-3w	15	1772

Nebraska

Company, Well and Location	Init. Prod. Bbls.	Depth
Richardson County—		
Marion Travis, Stauffer 1, swc ne 22-1n-13e	*	3141
Liberty Dev. Co., Fehr 1, c nw se 31-2n-16e	*	2595
Skelly, Wallraff 3, se nw se 20-1n-16e	618	2252

New Mexico

Company, Well and Location	Init. Prod. Bbls.	Depth
Eddy County—		
Carper-Keohane & Saunders, Hinkle 2-A, sw se se 34-18-31	45	3625
Dominion Oil Co., Johnson 4-A, c se sw 35-16s-31e	55	3873
Sam Sanders et al, Berry 9, sw se ne 24-17-27e	5	505
Lea County (Maljamar)—		
B. Cockburn et al, Baish 28-B, c se se 28-17s-32e	474	4005
Baish 31-B, c sw sw 28-17s-32e	192	3970
R. W. Fair & C. M. Pope, Johns 1-B, c nw se 26-17s-32e	780	4275
Maljamar O&G Corp., Baish 4-B, c sw sw 22-17s-32e	350	3992
Baish 5-B, c se se 21-17s-32e	520	3950
Baish 6-B, c sw se 21-17s-32e	200	4094
Williams & B. Cockburn, Miller 7-A, c sw sw 23-17s-32e	490	4035

New York

ALLEGANY COUNTY

Company, Well and Location	Init. Prod. Bbls.	Depth
W. M. Reynolds, Holtum farm, Scio	5	1140
N. V. V. Franchot, Reddy farm, Alma	7	1482
Sloan & Zook, McDivitt farm, Bolivar	3	1383
Water Intake Wells—		
Ebenezer Oil Co., Norton farm, Bolivar	...	1566
Bradley Prod. Corp., Lewis farm, Alma	...	1559
Roy E. Vossler, McEnro farm, Alma	...	1274
Bohne Bros., Materna farm, Wellsville	...	1461
L. H. Richardson et al, Browning-Wright farm, Scio	...	954

Ohio

Company, Well and Location	Init. Prod. Bbls.	Depth
Ashland County—		
Gold Crown, Easley 10	*	635
Athens County—		
Cook et al, Copeland 4	¶0.5	631
Brooks Johnston, Starlin 1	¶0.3	800
J. A. Wickens, Meek 1	¶0.08	870
Ohio Fuel, Koker 1	¶0.03	1620
Hatch 2	*	1955
Gifford et al, Parmiter 5	2	441
Belmont County—		
L. R. Shores, Eamsey 3	7	1420
Guernsey County—		
Jewell Gas Co., Miller 2	¶0.12	1187
Holmes County—		
Bell Bros., Finley 1	¶0.03	864
Ohio Fuel, Miller 1	*	4179
Knox County—		
H. E. Perkins, Mickley 2	¶3.1	2763
Knox Explor. Co., Fry 1	¶3.0	2800
Lawrence County—		
Kachelmacher Est., Mineral Products Co. 2	*	2861
Licking County—		
Moore Bros., Walker 1	¶1.9	2602
Gail Earley et al, Patterson 1	¶0.55	2352
Everette Co., Mound Mort. Co. 2	¶0.45	2490
Penick et al, Lynn 1	¶0.27	2590
Ohio Fuel, Roe 1	¶0.12	2635
Nesbitt 2	*	2562
Heisey Gas Co., Jeffries 1	*	2305
Lorain County—		
Ohio Fuel Gas, Betts 3	¶2.25	2435
Medina County—		
Thronton Prod. Co., Ross 41	5	478
Ross 42	5	495
Sanford & Watson 025	I	538
Sanford & Watson 026	I	353
W. E. Sawyer, Wilbur 2	1	524
Meigs County—		
Bengel, Graham 1	¶0.24	541
Sumner O. & G. Co., Roush 5	¶0.15	3103
Home Utilities Co., Karr 1	¶0.02	3065
Monroe County—		
Barnesville Dev. Co., Carpenter 1	*	2260
A. E. Robinson et al, Baker 1	*	1910
Morgan County—		
Crowley et al, Bowman 4	2	982
Breman O. & G., Peters 2	*	1036
Noble County—		
Gerst et al, Bettinger 1	10	605
Yoker Valley Gas, Ankrom 3	¶0.35	1550
Barnesville Dev. Co., Heisler 1	*	5800
Perry County—		
Ohio Fuel, Rousculp 1	¶1.4	3076
Routh, Post 21	*	1173
Stark County—		
Kemrow Co., Firestone 1	*	4636
Tuscarawas County—		
Status Dev. Co., Ludi 1	¶0.38	5007
East Ohio Gas, Christ 1	¶0.24	4998
Washington County—		
Henning et al, Cullen 5	35	1360
Lorentz Bros., Fee 5	5	981
Campbell, Mercer 1	¶0.11	1210
Ohio Fuel, Berg 1	*	1893
Koon Run Oil, Hendershot 4	*I	1445
Wayne County—		
Kemrow Co., Kean 1	¶0.54	3000

"I" indicates pressure input well.

Oklahoma

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo County—		
Ohio, Bruce 7, sw swc ne 11-5n-9w	930	3350
Carter County—		
Elliott, Pierce 3, se sw ne ne 22-2s-2w	52	1190
Westheimer et al, Bennett 1, sw sw nw 17-4s-2w	*	2418
Bennett 3, se se sw nw 17-4s-2w	*	2381
Turner, Ward 7, nw se nw nw 28-4s-2w	38	2340
Lamb, Fee 1, ne nw ne 29-4s-2w (otd 2324 ft)	15	2418
Comanche County—		
H. Phillips, Reich 1, nwc sw 29-4n-10w	*	2901
Grady County—		
McCasland, Ball 1-A, nw nw se se 21-3n-5w	50	2383
Hughes County—		
Scruggs, Black 2, ne nw ne ne 13-9n-10e (pb 2220 ft)	¶0.67	2600
Jackson County—		
Doss, Robertson 2, se nw se 15-1n-20w	300	1380
Kiowa County—		
Southwestern Okla. O&G, Foltz 2, nw se se 10-6n-18w	*	2000
Lincoln County—		
Herndon, Lader 1, sec sw 10-12n-5e	*	3965
Mid-States, Provaznik "B" 2, nw se sw 33-12n-6e	150	3289
Muskogee County—		
Foltz, Bartholet 1, sw swc nw 16-14n-17e	*	1998
Okfuskee County—		
Doak et al, Townsite 1, swc nw 15-10n-11e	*	3125
Flemming, McKinney 2-A, sw sw nw se 18-10n-11e (otd 1171 ft)	25	2224
Seran, Fee 6, nw sw nw 2-11n-8e	180	3603
Titus, Berryman 2, swc 25-11n-8e	600	3431
Titus et al, Jackson 2, nw se nw nw 25-11n-8e	100	3097
Foundation, Berryman 2, se ne ne 35-11n-8e	15	3433
Reese, Berryman 3, swc 36-11n-8e	110	3510
Keener, McKernan 1-A, nwc ne 26-12n-8e	*	3871
Martin et al, Parsons 1, ne nw ne 28-13n-10e (otd 3890 ft)	35	3600
Oklahoma County—		
Phillips, Holtz 1, nw se nw 34-12n-3w	140	6545
Westgate, Carey "A" 2, sw ne nw se 34-12n-3w	437	6523
Okmulgee County—		
Staples et al, Sanders 1-A, nw nw sw ne 11-11n-12e	*	2021
Osage County—		
Brookhaven, Osage 1, nec sw 6-22n-8e	*	3090
Payne County—		
Amerada, Fruin 3, c w½ se nw 12-17n-1e (pb 4691 ft)	1176	4868
Magnolia, Cain 3, c w½ ne sw 12-17n-1e (pb 4667 ft)	3000	4863
Crosbie, Moore 1, nw ne nw 29-19n-2e	*	4847
Pontotoc County—		
Simpson-Roodhouse, Montpelier Trust 1, swc nw 20 2n-6e	*	4518
Sinclair Prairie, Moody "A" 2, sw se ne 22-2n-7e (pb 1458 ft)	10	3825
Grisso, Norris 1, nec nw 14-4n-7e	*	2765
Mohican, Norvell 1, nw ne ne 34-5n-4e	18	2663
Sunray, Lee 10, nw sw ne ne 33-5n-8e	10	905
Pottawatomie County—		
Zeigler, Simms 1, nwc se 16-7n-4e (pb 3650 ft)	*	4242
Mudge, Bowling 1, nwc 25-9n-4e	125	4238
Seminole County—		
Stanolind-Amerada, Sarkey "B" 1, ne nw se 31-7n-8e (pb 3020 ft)	¶1.3	4152
Stephens County—		
Keister, Edrington 1, sw se ne 16-1s-5w	*	...

Pennsylvania

BRADFORD DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Albert H. Tyler, Warters	3	....
Quinlan Oil Co., Fee	2	....
L. H. Kervin No. 2, Berry	1	....
Forest Oil Corp., 2 wells	2	....
Forest Pet. Corp.	1	....
Niagara Oil Corp.	1	....
Bradford Tr. Co., 18 wells	18	....
Water Intake Wells—		
Niagara Oil Corp.	...	....
Forest Pet. Corp., 2 wells	...	....

NEW YORK-PENN GAS FIELD

Company, Well and Location	Init. Prod. Bbls.	Depth
Hanley & Bird, Barney	¶	....

MIDDLE DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Venango Oil & Land Co., Lower Reno, 2 wells	2	....
Exchange Bank & Tr. Co., Franklin, Whieldon	1	....
W. D. & F. T. Barry, Given & Barry	1	....

BUTLER-ARMSTRONG DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Harvey J. Geibel, Hortsmann	¶	....

SOUTHWEST DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Armstrong County—		
Chestnut Ridge, Shirley 3	¶0.22	1600
John Wray et al, Williamson 2	¶0.15	1296
T. W. Phillips, Gilchrist 1	¶0.03	3558
Peoples Nat. Gas, Coulter 1	¶0.02	3733
Clarion County—		
Mayport Clay Co., Wyncoop 1	¶0.04	2814
Fayette County—		
Nolem, McCann 1	¶ 2.5	1330
George L. Yates, Penn R.R. 1	¶ 1.1	1140
Duquesne Gas, Talbert 1	¶0.07	2377
Greene County—		
Johnson & Stephenson, Bruno 1	¶0.21	1502
Carnegie Nat. Gas, Sowers 2	*	2245
Indiana County—		
T. W. Phillips, Overdorf 1	¶0.22	3005
Bethel 1	¶ 0.5	1735
Jones 2	¶0.15	1702
Campbell 1	*	3401
A. L. Light Coal Co. 1	*	3358
R. & P. Coal Co. 1	*	3307
Washington County—		
Equitable Gas Co., Ripple 1	¶0.19	2092
Chivers et al, Brister 2	¶0.09	2691
Westmoreland County—		
Peoples Gas Co., Kuhns 1	¶0.03	3902
Hill 1	*	3879

West Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Crane County (Sand Hills Deep)—		
American Liberty et al, Tubb 11	4524	5772
Gulf, Tubb 2-A	7170	5773
Crane County (Sand Hills)—		
Humble, Tubb 48	3764	4400
Ector County (Foster)—		
Atlantic Ref. Co., Foster 3-B	936	4130
M. B. K. Dr. Co., Foster 11-C	659	4308
Ector County (Goldsmith)—		
Gulf, Goldsmith 331	913	4241
Ector County (Jordan)—		
Cities Service, University 5-B	2217	3559
Ector County (Judkins)—		
Waldrop & Pattillo, McKenzie 2	561	3665
Ector County (North Cowden)—		
Barnsdall Oil, Smith 21	849	4330
Gaines County (Seminole)—		
Amerada, Hahn 1	672	5335
Sawyer 2-A	805	5355
Riley 7-A	683	5300
Humble, Matthews 1	420	5317
Ohio Oil, Gibbs 5	664	5332
Hockley County (Duggan-Slaughter)—		
Devonian Oil Co., Citizens Bank 1	1206	5020
Magnolia, Mallet L&C Co. 2-D	559	4985
Stanolind, Slaughter 9-A	1154	5054
Mitchell County (Northwest)—		
Cree & Hoover, Strain 1	196	1685
Art Wagner et al, Fuller-Conoco 1	323	1750
Nolan County—		
Tex-Harvey Oil Co., McRee 1	*	5210
Pecos County (Shearer)—		
Childress Roy. Co., Masterson-I.T.I.O. 13	31	1515
Pecos County (Walker)—		
J. M. Odom et al, White-Baker 1	111	2023
Terry County (Wildcat)—		
Gulf, Mallett L&C Co. 4	*	6000
Upton County (McCamey)—		
T. P. Coal & Oil Co., Lane 13-E	290	2306
Ward County—		
Gulf, Estes 141	882	2657
Hutchings 150 (pb to 2784 ft)	91	3200
Winkler County (Keystone)—		
J. R. Sharp et al, Jenkins-Little 2	196	3395
Yoakum County (Wasson)—		
Aloco Oil Co., Willard-Texaco 11-B	842	5220
Don Danvers et al, Willard 11	944	5266
Denver Prod. & Ref. Co., Whittenburg 22	1292	5148
Magnolia, Mahoney 23	379	5183
Sinclair Prairie, Willard 1-737	1053	5270
Skelly Oil, Comer 2	585	5215

United States Well Completions—*Continued*

North Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County (Hull-Silk Deep)—		
Helmerich & Payne, Wilmot 2	2088	4644
Texas Co., Wilson 6-B	1056	4560
Archer County (Hull-Silk)—		
Cox & Hamon, Anderson-Norwood 1	94	4435
Anderson-Weeks 1	40	4425
Dillard-White-Duncan, Nichols 13	1032	4400
W. H. Peckham et al, Krebs 3	864	4385
Pet. Producers Co., Anderson 4-C	984	4425
Archer County (Mankins)—		
Roeser-Pendleton, Wilson 1	1325	4798
Archer County—		
Deep Oil Dev. Co.-Christie, Finley 5	21	1316
Bert Ligon et al, Little 10-B	50	1363
Archer County (Wildcat)—		
L. T. Burns et al, Perkins-Shell 1	•	2702
Clay County (Halsell)—		
Bridwell Oil Co., Halsell 7-A	294	4744
Clay County—		
(Antelope-Shell-Henderson)		
Shell, Henderson 2	1692	3260
Clay County—		
L. T. Burns et al, Hamilton 7	8	265
Johnson-Kouri-Morgan, Taylor 4-39	10	1127
Clay County (Wildcats)—		
British-American O. P. Co., Stine 2	•	1831
L. W. Stanford et al, Jones 1	•	782
Cooke County—		
Humble, Hellman 9	303	1280
Streng 1 (pb to 1320 ft)	24	2022
Whitefield-Pearson-Grimes, Sicking 4	255	1271
Cooke County (Walnut Bend)—		
Sun Oil, Snuggs 9	370	4911
Jack County (Wildcat)—		
Paul Steed et al, Haag 1	•	3390
Jack County—		
Hanlon & Buchanan, Smith 1	156	2978
Kimbell & Bohner, Shoun 1	57	3075
T. C. Jones et al, Smith 12	6	380
Montague County (Bonita)—		
Sinclair Prairie, Bonita Southeast Unit 1	1922	5459
Montague County (Benton-Holmes)—		
Phillips Pet. Co., Fields 1	•	3813
Wichita County—		
(K-M-A Ellenburger)		
Magnolia, Thom 4	42	4494
Wichita County (K-M-A)—		
Consolidated Oil Co., Barnes 2-B	•	4025
Sunray Oil Co., Mangold 12	1120	3831
Ven-Mex Oil Co., Big Wichita River 16-A	808	3790
Wichita County—		
J. W. Gookin et al, Allen-Foster 1-A	•	1260
Hall-Jordan Oil Co., Warren 5	•	610
A. C. Parks et al, Roller 2	•	633
Wilbarger County (Fargo)—		
Amerada, Dodson 1-B (pb to 4002 ft)	904	4415
Young County (Wildcats) —		
L. T. Burns et al, Leberman 1	•	891
Keriyn Oil Co.-Phillips Pet. Co., Dalrymple 1	456	2953
Kimmell, Lee & Co., Campbell 1-A	30	964
Young County—		
Cato Bros. et al, Hamilton 1	9	876
T. J. Harrell et al, Rogers 6	151	904
J. Henry et al, Morrison 2	•	975
Thos. Humphrey et al, Butler 1-A	6	5046
Geo. Keith et al, Clark 1	•	950
Kimmell, Lee & Co., Campbell 1-B	75	970
Marchman et al, McCloud 1	•	955
N. H. Martin & Son, Hamilton 13-A	5	933
Ray Oil Co.-J. P. Nash, Bills 7	560	2807
H. B. Sparks et al, Clark 4	•	934

Texas Panhandle

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
Cities Service, Magnolia 5-F	161	3115
Magnolia, Fee (Tr. 244) 95	56	2949
Gray County—		
Magnolia, Fee (Tr. 227) 40	221	2896
Hutchinson County—		
McIlroy Oil Co., Tomlinson 8	550	3175
Skelly Oil, Watkins 10-B	186	2886
Wheeler County—		
Pendleton & Vaughn, Holland 2	•	2278

West Central Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Callahan County—		
J. A. Campbell et al, Scott 1	•	900
Coleman County—		
Brannon & Murray, Dibrell 3-B	324	1912
North-South Oil Co., Newton 8	150	3865
States Oil Corp., Morris 8	173	3593
Eastland County—		
Dobbs Oil Corp., Thompson 2	175	2655
Jones County (Wildcat)—		
Danciger O&R, Kelso 1	209	2341
Jones County—		
Iron Mt. Oil Co.-Groover & Rose, Peterson 1	•	1729
F. K. Johnson-Ungren & Frazier, Sayles 2	130	1939
Palo Pinto County—		
W. K. Gordon et al, T. P. Coal & Oil Co. 1	•	3574
Shackelford County (Wildcat)—		
L. H. Choate et al, Green 1-A	•	1265

Texas Gulf Coast

Company, Well and Location	Init. Prod. Bbls.	Depth
Anahuac—		
Humble, Middleton 57	666	7233
Bammel—		
Harrell, Graves B-1	¶	6200
Blessing—		
Texas, Tyson Unit 1	125	8327
Fannett—		
Gulf, Thomas 21-E	216	6566
Lovell's Lake—		
Humble, Broussard 27	144	7794
Magnet—		
Humble, Cockburn 32	95	5539
Manvel—		
Texas, Morrison 5	555	5680
Old Ocean—		
Harrison & Abercrombie, BRLD 9	231	10,150
South China—		
Pan American, Fontenot 5	•	7950
Tomball—		
Humble, Lamport 1	415	5560
West Beaumont—		
Stanolind, Keith & Dowlen 14	30	5896
West Columbia—		
Texas, Phillips 18	445	5762
Withers—		
Texas, Pierce 67-B	118	5543
Pierce 68-B	108	5377

South Texas

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Aransas County (McCampbell)—		
Shasta Oil Co., Freeman 1	450	7223
Jackson County (Lolita)—		
Magnolia, Ward 8	300	5284
Jackson County (West Ranch)—		
Magnolia, West 121-A	1000	5128
Jim Wells County (East Alice)—		
Bryant & Sanner, Ingram 2-A (Relief)	•	5170
Jim Wells County (Wade City)—		
Lewis Prod. Co., Stech 1	300	4800
Live Oak County (White Creek)—		
Grimes & Patterson, Kibler 1	•	1495
Live Oak County (Wildcat)—		
Coquat, Goebel 1, 362-ac lse, 4 mi ne Oakville	•	3510
Nueces County (Minnie Bock)—		
Averill & Cox, Driscoll 1	•	4765
Nueces County (Wildcats)—		
Henshaw Bros., Dougherty 1, 100-ac lse, Bluntzer partn, 6 mi se Orange Grove	•	6510
S.E.W. Oil Corp., Pfluger 2, sec 186, F. Z. Bishop Palo Alto subd	¶70.0 & 500	7143
Refugio County (Tomoconnor)—		
Quintana Pet. Corp., Heard 44	1200	5925
Refugio County (Wildcat)—		
Barnsdall, Marberry 4, Nicholas Fagan sur, ab 25	500	5638
Victoria County (Heyser)—		
Gulf, Traylor 47-B	500	5493
Victoria County (Placedo)—		
Haynes B. Ownby Dr. Co., Marek 1	400	4765

LAREDO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Jim Hogg County (Kelsey)—		
Humble, McGill 57	325	4744
Webb County (Glen)—		
Interstate Minerals, Lopez 53	75	2176
Webb County (Wildcats)—		
O. W. Killam, Bruni 1 (60), 1079-ac lse, 1 mi e Albercas fld	•	3396
Seaboard Oil, Newton 2, C & M Ry Co. sur 1531, 19 mi nw Oilton	•	1830

SAN ANTONIO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Caldwell County (Wildcat)—		
Wiegand Bros., Freeman 1, Robert Carr sur, 1 mi n Salt Flats	•	2950

East Texas

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
J. W. Akin-Bert Espey, Mason 3 (3½-ac)	1500	3664
Kilgore Area—		
Cities Service, Walker 22 (152.21-ac)	900	3713
Fair Oil Co., Carr 6-A (34.04-ac)	850	3511
Hamill & Smith, Knowles 11 (1.53-ac)	500	3569
H. L. Swindler et al, Mayfield 9 (54-ac)	720	3687
Mayfield 10 (54-ac)	960	3711
Longview Area—		
Atlantic Ref. Co., Flemister 7 (22½-ac)	6000	3673
Jones 12	5400	3667
O. C. Bailey & Trimble, Jones 9 (15-ac)	4500	3660
Dyck Oil Co., Christian 13 (37-ac)	7000	3580
Roger Lacy (was Texas Canadian), Victory 19	2500	3668
Victory 20 (100-ac)	2500	3670
Peyton Bros., Christian 7 (17.77-ac)	5500	3590
B. F. Phillips et al, Jackson 1	1200	3685
Stanolind, Cloud 8 (35-ac)	1500	3671
Anderson County (Cayuga)—		
Harper & Turner, Loper 1-B	110	4096
Anderson County (Long Lake)—		
F-H-E Oil Co., Morrow 1	¶115	5335
S. H. Killingsworth et al, Tull 1	75	5275
Freestone County (Wortham)—		
McNeil Pet. Co., Simmons 2	•	500
Limestone County (Barron)—		
C. L. Brown et al, Barron-Magnolia 1	¶5.5	5667
Wood County (Hawkins)—		
S. J. Rotundi-Jackson et al, Cobb 1 (5-ac)	2910	4648

West Virginia

Company, Well and Location	Init. Prod. Bbls.	Depth
Calhoun County—		
Hope Nat. Gas, Robinson 1	¶1.4	1809
Bennett 8523	¶0.18	2317
White Pine O. & G., Ferguson 2	¶0.3	2123
P. P. Gunn et al, Fowler 1	•	2220
Clay County—		
Pitts. & W. Va. Gas, Byrne 7774	¶1.1	2324
Gilmer County—		
McCall Dr. Co., Kelly 2	¶0.1	2290
Roberts & Weekley, Bonnett 2	3	1390
Burge & Lowther, Vanhorn 1	¶0.05	1940
Jackson County—		
Godfrey L. Cabot, Putnam Co. 11	¶6.36	5281
Kanawha County—		
T. C. Matthews, Higginbotham 1	¶7.8	5082
United Carbon Co., Peters 1	¶4.53	4786
Godfrey L. Cabot, Mason 1	¶2.67	5036
United Fuel Gas, Wines 4892	¶0.62	5054
Shafer 1	¶0.22	1885
Logan County—		
South Penn, Yawkey-Freeman 60	¶0.56	2878
Marshall County—		
Cameron Lt. & Ht. Co., McConnough 1	¶0.07	3090
Monogalia County—		
Owens-Libby-Owens, Howell 2	¶0.03	3065
Putnam County—		
E. J. Elkins, Tallman 2	¶7.02	1750
Midway City Gas Co., Switzer 4	¶0.44	3650
Summit Gas Co., Paul 1	¶0.12	1542
Edwards Gas Co., Edwards & Hall 1	¶0.11	2448
Ritchie County—		
Kerns Farm O. & G. Co., Kerns 1	1	1700
L. E. & W. H. Mosser, Goff 1	¶0.16	1954
Reno Oil Co., McIntire 1	¶0.08	2090
Loris Swadley, Hardman 1	¶0.05	1750
Clem S. Morris, Rexroad 1	¶0.03	2034
Wayne County—		
Industrial Gas Corp., Booth 1	¶0.12	2893
Hamilton Gas Co., Shafer Bros. 2	•	3262
Wirt County—		
Glen W. Roberts, Welch 1	•	2473

Wyoming

Company, Well and Location	Init. Prod. Bbls.	Depth
Crook County (Kara Terrace)—		
M. D. Miller, Commercial 1, sw se 19-49n-66w	•	1240
Sweetwater County (East Hiawatha)—		
Vermillion Oil Co., Horrocks 1, sw sw sw 7-12n-99w (owdd from 3504 ft)	¶8.5	3540
Weston County (Osage)—		
Carl Kundy, No. 5, ne sw sw 29-45n-63w	70	1332
Riggs Oil Co., No. 4, ne ne se 16-46n-64w	•	3260

Southern Gas Extends East Texas Pipe Line System

Southern gas Company is expanding its high-pressure natural gas system, extending from the Willow Springs deep gas-distillate pool, situated east of the Gregg County portion of the East Texas field. Roger Lacy of Longview, Texas, is president of the firm, and is supplying the gas from his two 7300-foot wells. The company recently built a 11-mile 6-inch carrier to Gladewater, and has completed a 10-mile 4- and 6-inch extension to the Kilgore townsite sector, where it will supply gas for lease operations. Its original project involved the laying of a 2½-mile 8-inch carrier from the pool to Longview, with a 6-mile 4- and 6-inch loop via Greggton to Longview. The construction of an extension to the new Hawkins pool, Southeastern Wood County, is pending.

WILDCAT REPORT
New Starts and Completions

ARKANSAS
FIRST REPORT

Sevier County—Gramp Oil Co.'s Phillips 2, sw 26-9-30, rig.

COMPLETION

Union County — E. G. Bradham et al's Slaughter 1, se se 9-17-16, Smackover lime 6722 ft, sw, abnd 6821 ft.

CALIFORNIA
FIRST REPORTS

Kern County—E. C. Brown's Gibson 1, sec 5-28-29, rig, Round Mountain area. Cresmont Oil Co.'s Russell 1, sec 6-28-29, grading, Round Mountain area.

Los Angeles County—Universal Cons. Oil Co.'s Dennis 1, sec 21-4-17, lcn, Castaic area.

Mendocino County—N. F. Keyt's No. 1, sec 3-12-17, lcn, Point Arena area.

COMPLETION

Sacramento County—Independent Explor. Co.'s Unit Plan 1, sec 19-7-6, td 4808 feet, top basement rock 4791 feet, formation test showed trace of gas, abnd.

KANSAS
FIRST REPORTS

Barton County — British-American et al's Linder 1, nec sw 24-17-14w, mim.

Graham County — Ewers-Simpson et al's Bundy 1, c sw sw 19-9-22w, cellar.

Republic County—Wilcox et al's Hirman 1, c se nw 30-2s-1w, dr.

Rice County—Hinkle et al's Kitchen 1, c w½ nw ne 11-18-9w, lcn. Hess & Son's McKee 1, c e½ ne se 8-22-8w, mim.

Stafford County—Hamilton et al's Thole 1, c e½ se se 23-21-12w, pits.

COMPLETIONS

Barber County—Derby & Coppinger et al's Hancock Life 1, e se se 10-32-12w, 8 mi ne Medicine Lodge pool, Mississippi 4307-4581 ft, Arbuckle 4776-4840 ft, pb 4450 ft, 2000 gals butane and 1200 gals acid, showed 15 bbls per day, heavy black oil, abnd 4840 ft.

Cowley County—Wakefield et al's Durham 1, c w½ nw se 34-30-3e, 2 mi s Udall pool, Mississippi 3020-3307 ft, Arbuckle 3419-30 ft, hfw 3425-30 ft, abnd 3430 ft. Stelbar Oil Corp.'s Bahruth "A" 1, ne se ne 8-34-3e, new horizon in Gueda Springs pool, otd 3312 ft, base Mississippi 3625 ft, Arbuckle 3735 ft, td 3737 ft, pumped and flowed 425 bbls, 40 gr.

Ellis County—Aladdin et al's Kuhn 1, c n½ ne ne 17-14-16w, 4 mi sw Trapp pool, Topeka 2911 ft, Dodge 3108 ft, Lansing 3181 ft, sso 3219 ft, cored 3263-73½ ft, rec 10½ ft saturation, base Kansas City 3420 ft, Sooy 3430 ft, Arbuckle 3443 ft, abnd 3500 ft.

SOUTH LOUISIANA
FIRST REPORTS

Iberia Parish — Texas Co.'s State-South Marsh Lands 1, 25,800 ft s, 1800 ft w of swc sec 26-17s-5e, lcn. Texas Co.'s State-South Marsh Lands 2, 22,000 ft s and 2300 ft e of swc sec 26-17s-5e, lcn. Texas Co.'s State-South Marsh Lands 3, 20,000 ft s and 4500 ft e of swc sec 26-17s-5e, lcn. F. K. Campbell's Darby 1, Spanish Lake area, sec 56-11s-6e, prev abnd 8020 ft, re-enter to deepen past 9000 ft.

COMPLETIONS

Calcasieu Parish—Continental and W. T. Burton's Mayo Realty Co. 1, sec 8-11s-8w, South Lake Charles prosp, blew out 10,843-847 ft, stuck dp, blew out, leaks in casing, abnd mech diff 10,939 ft.

West Baton Rouge Parish—H. C. Cockburn's Gianelloni Est. 1, sec 58-8s-1e, se University fld, electrolog, sw cores, 8960 ft, temp abnd .

NORTH LOUISIANA
FIRST REPORT

Tensas Parish—Fred Shields et al's Panola Co. 1, se nw 34-13n-12e, rig. H. L. Hunt's Ayer Lbr. Co. 2, rig.

COMPLETION

LaSalle Parish—Sinclair Prairie Oil Co.'s Goodpine Oil Co. 1, se se 28-9n-3e, abnd 4515 ft.

Tensas Parish—H. L. Hunt's Chicago Mill & Lbr. Co. 4, sw se 14-13n-10e, abnd 4025 ft.

Union Parish—Tiki Exp. Co.,'s Jones 1, ne ne 30-21n-3w, elev 128 ft, Wilcox 1015 ft, Nacatosh sand 2103 ft, sw, abnd 3150 ft.

MISSISSIPPI
COMPLETION

Bolivar County—Ed S. Holman's Thomas 1, ne ne 18-24n-7w, elev 153 ft, went into new hole at 1842 ft, 20-min drill-stem test at 1776 ft recovered 90 ft mud, slight sg, abnd 4646 ft.

MICHIGAN
FIRST REPORTS

Huron County—Fortney Oil Co.'s Bank 1, ne ne se 14-15n-14e, lcn.

Lenawee County—George L. Kernodle's Timmins 1, ne se ne 26-7s-5e, rig.

COMPLETIONS

Allegan County—McClanahan Oil Co.'s Funk 1, sw nw sw 28-4n-12w, Traverse 1635 ft, abnd 1690 ft.

Midland County—C. L. Maguire, Inc.'s Crosse 1, nw sw ne 33-16n-2w, Dundee 3730 ft, abnd 3850 ft.

MONTANA
FIRST REPORTS

Glacier County—Ed Reagan's Tribal 1, cwl sw nw 22-37n-7w, Reagan structure, northwest of Cut Bank field just south of International Border in northern Montana, spd.

Toole County—Hole Brothers' Potter 1, cne ne 23-33n-4w, Aloe "nose" northwest end of Kevin-Sunburst field. Set 10¾-in csg at 160 ft. Dr 225 ft.

NEBRASKA
COMPLETIONS

Richardson County—Marion Travis et al's Stauffer 1, swc ne 22-1n-13e, 16 mi w Falls City pool, light saturation 1992-95 ft, Maquoketa 2706 ft, Viola 2761 ft, St. Peter (Wilcox) 3317 ft, abnd 3141½ ft. Liberty Dev. Co.'s Fehr 1, c nw se 31-2n-16e, 2½ mi n Falls City pool, Red Hematite 2364 ft, Misener had water at 2568 ft, Hunton 2595 ft, abnd 2595 ft.

NEW MEXICO
FIRST REPORT

Eddy County—Bryant & Sudderth's Wills 1, c nw se 14-20s-28e, mach.

OKLAHOMA
FIRST REPORTS

Creek County—Link Oil Co.'s Kinch 1, ne sw ne 25-16n-7e, mi tools.

Hughes County—Mid-Continent et al's Davis 1, sec nw 15-6n-8e, lcn.

Kay County—Continental et al's Granan 1, nw ne sw 23-28n-3e, pits.

Okfuskee County—Burke-Greis et al's Mullins 1, sw se se 5-10n-10e, rust.

Osage County—Black Jack Oil Co.'s Osage 1, nec sw 29-25n-7e, pits.

Pottawatomie County—Grisso et al's La Rean 1, nec sw 33-6n-3e, owdd, mirt.

COMPLETIONS

Comanche County—H. Phillips et al's Reich 1, nwc sw 29-4n-10w, 12 mi se Cement pool, water sd 2514-28 ft, Wichita Albany 813-1200 ft, Pontotoc 1200-1795 ft, Springer 1795 ft, core 2712-12 ft, shale, dip 40 to 45 degrees, core 2887-2901 ft, rec 3 ft black sdy shale, abnd 2901 ft.

Kiowa County—Dempsey et al's Dempsey 1-A, nw sw ne 31-4n-18w, 15 mi ne Altus pool, abnd 283 ft. Southwestern Oklahoma O&G Co.'s Foltz 2, nw se se 10-6n-18w, Hobart townsite, abnd 2000 ft.

Tillman County—Kadane Bros. et al's Andrews 1, nwc 35-2s-19w, 1 mi n West Frederick pool, Arbuckle 5530 ft, 1500 gals acid 5405-5591 ft, abnd 5632 ft.

Stephens County—Brown et al's Dilly 1, c se se 6-3s-5w, between Loco and Woolsey pools, Arbuckle 1702 ft, abnd 1838 ft.

SOUTH TEXAS
FIRST REPORTS

Jim Hogg County—M. L. Massingill's McLean 1, sec 3, Las Animas gr, 15 mi sw Hebbronville, elev 830 ft, 3000-ft test, lcn. Sun's East 4, AB&M sur 39, blk 33, 16 mi sw Hebbronville, elev 647 ft, 4250-ft test, lcn.

Jim Wells County—H. H. Howell's Cumings Est. 1, 83.6-ac sec 60, L. G. Collins subd, ½ mi se Reese & Dunn Stillwell 1, 5600-ft test, mi. Lee Johnson's Singer 1, ctr of w 20 ac, of e 40 ac, of n 160 ac, Goldston 1000-ac lse on Singer lands, 5300-ft test, contract to Trinity Drillers, lcn. Romain S. Waldron's Rother 1, ctr of blk 83, Zander Farm lots subd, lcn.

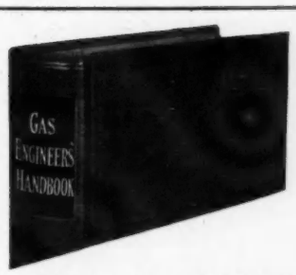
Live Oak County—Beacham & West's Atkinson 1, 80-ac lse, subd "B," Nichols rch, Louis Ayers sur, 6 mi nw Three Rivers, Atex Dr. Co., contractor, lcn.

Refugio County—G. L. Norsworthy's Fagan 3, 150-ac tr, Nicholas Fagan sur, abt 2000 ft s Barnsdall's Marberry 4, 5600-ft test, lcn.

San Patricio County—Henderson Coquat's Willman 1, 40-ac lse, 368.31-ac William tr, Delgado sur, 1½ mi w Mathis, 5300-ft test, mi.

Starr County—Complete Oil Well Service Co.'s Garcia Land & Livestock Co. 1, 50 ac of n 100 ac of Sun Oil 200-ac lse, out of w½ porc 100, Juris of Camargo, on 100-ac farmout lse, 1 mi nw Sullivan City, elev 240 ft, 4300-ft test.

Zapata County—Yehudi et al's Cuellar 1,



GAS ENGINEERS' HANDBOOK

Prepared by Gas Engineers' Handbook Committee of The Pacific Coast Gas Association, San Francisco, California

Here is a comprehensive and authoritative manual, giving the gas engineer a reference tool comparable to the standard handbooks in other fields of engineering. Now in one volume are brought together a great many of the constants and formulas which the gas engineer uses most frequently in his work. Every phase of the field is covered, including fundamental mathematics; properties of materials, liquids, and gases; heat and combustion; production; testing and measurement; transmission and distribution; and utilization, both industrial and domestic.

For the various constants, latest figures from recognized sources have been used. New material is included on long transmission lines, on the design of distribution systems, on the production and utilization of natural gas and on the production and use of the so-called "liquid" gases. That the effort to make this book useful and acceptable to engineers throughout the industry has been successful is indicated in the endorsement of the Directors of the American Gas Association which it bears, as a "valuable reference book for gas engineers."

MAIN SECTION HEADINGS

1. Mathematical and Conversion Tables and Graphs
2. Properties of Elements, Common Substances, and Engineering Materials
3. Properties of Gases, Air, Steam, and Water
4. Fuels and Combustion
5. Production of Gas
6. Testing and Measurement
7. Transmission and Distribution
8. Utilization of Gas

1008 pages, 6 x 9, 344 illustrations and graphs, 466 tables, $7.50

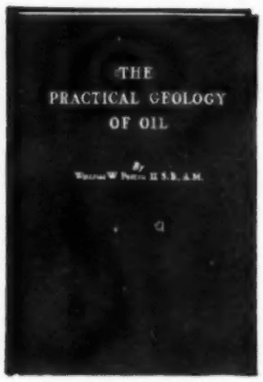
SEND ORDERS TO

THE GULF PUBLISHING COMPANY

3301 BUFFALO DRIVE **BOX 2608** **HOUSTON, TEXAS**

"The Practical Geology of Oil"

By WILLIAM WOOD PORTER, II, S. B., A. M., Consulting Geologist



A new book which will be of special interest to executives, engineers, draftsmen and others engaged in the oil business.

In this book the basic geological principles involved in all phases of the oil business, and apart from the department of the professional geologist, are described in a book short enough to be read easily, non-technical enough to be understood without previous study of geology and complete enough to make fundamental geological processes understandable. No one with a real interest in the oil business should be without an understanding of the geological background. This book is interesting as well as instructive.

CONDENSED
TABLE OF CONTENTS

CHAPTERS:

1. Geological Problems.
2. Geological Names.
3. Introduction of Rocks.
4. Minerals.
5. Rocks.
6. Erosion.
7. Geological Time.
8. Fossils.
9. Sedimentation.
10. The Crust of the Earth.
11. Structural Geology—Folding and Faulting.
12. Concentration of Oil.
13. Unconformities.
14. How Wells Are Drilled.
15. Geology of the Hole.
16. Geological Exploration.
17. Geological Maps.
18. Sources of Geological Information.
19. What Price Oil Fields.

145 Pages — Size 5½" x 8¼"
Cloth Binding — Price $1.50

Send Orders to

The Gulf Publishing Co.

P. O. Drawer 2608 — Houston, Texas

blk 12, sur 411, 2 mi ne Escobas fld, 2000-ft test, lcn.

COMPLETIONS

Caldwell County—Wiegand Bros.' Freeman 1, Robert Carr sur, 1 mi n Salt Flats, abnd 2950 ft.

Live Oak County—Henderson Coquat's Goebel 1, 362-ac lse, Refugio County School Land sur 6, 4 mi ne Oakville, abnd 3510 ft.

Nueces County—Henshaw Bros.' Dougherty 1 sh 7, Bluntzer partn, Casa Blanca gr, 6 mi se Orange Grove, abnd 6510 ft. S. E. W. Oil Corp. et al's Pfluger 2, sec 186, F. Z. Bishop Palo Alto subd, 1 mi s oil prod on se flank Agua Dulce fld, flowed gas and brown distillate, 7/32-in ch, 2500 lbs tp, 2750 lbs cp, td 7143, new sand, extends fld.

Refugio County—Barnsdall's Marberry 4, 568.29-ac lse, Nicholas Fagan sur, ab 25, 129 bbls per day, ¼-i-n ch, 375 lbs tp, 950 lbs cp, perf 5621-33, td 5638 ft, extends McFaddin fld.

Webb County—O. W. Killam's Bruni 1 (60), 1079-ac lse, Albercas gr, 1 mi e Albercas fld, abnd 3396 ft. Seaboard's Newton 2, C & M Ry sur 1531, 19 mi nw Oilton, abnd 1830 ft.

TEXAS GULF COAST

FIRST REPORTS

Harris County—Sun's Foster Lumber Co. 1, Amasa Turner sur, 6 mi ne Humble fld, making road for 7500-ft test. L. U. Roundtree's Greens Bayou Homesites 1, C. S. Hiroms sur, Greens Bayou prosp, lcn for 3000-ft test.

Montgomery County—O. C. Garvey's Horn 1, J. Sadler sur, ¼ mi n dry hole, pits for 7000-ft test.

WEST TEXAS

FIRST REPORTS

Howard County—Cosden Pet. Corp.'s Fee 1, nec T&P sec 47, blk 32, T-I-N, mim to drill for high-pressure air.

Ward County—J. E. Fitz-Patrick et al's Gaddie 1, south cor W&NW sec 23, blk 1, sp & sd on 5000-ft contract.

Yoakum County—Geo. P. Livermore-T. N. Sloan's Ownby-Shell 1, c ne ne sec 502, blk D, Gibson sur, elev 3558 ft, anhydrite 2580 ft, dr 2600 ft.

COMPLETION

Terry County—Gulf's Mallett 4, se sw se PSL sec 5, blk X, elev 3544 ft, missed regular Permian and Holt pays, abnd 6000 ft.

WEST CENTRAL TEXAS

FIRST REPORTS

Jones County — Fain - McGaha Oil Corp.-Claude Dally's Moore 1, T. O. Maltby sur 252, mim.

McCulloch County—W. J. Willard et al's Garrett 1, nec of G. F. Schneider sur 934, lcn for 2250-ft test.

COMPLETIONS

Jones County—Danciger's Kelso 1, blk 82, DeWitt CSL sur 126, elev 1793 ft, base Saddle Creek 2310 ft, Flippen sand 2335-41 ft, flowed 139.8 bbls 43-gr oil, 16 hrs, natural, new pool.

Shackelford County—L. H. Choate et al's Green 1-A, nwc n½ se¼ T&P sec 61, blk 12, abnd 1265 ft. Roeser-Pendleton & Conoco's Cook 1-A-118, c sw sw E. T. Ry. sec 117, elev 1811 ft, Lower Hope sand 1697-1700 ft,pumped 55 bbls 39-gr oil initial, new pool.

NORTH TEXAS

FIRST REPORTS

Archer County—H. F. Smiley et al's Tarr 1, blk 136, HS&CR sur, 2 mi n Archer City, lcn. Adams O&G Co.'s Powell 1, se cor blk 14, S. P. Ry. sur, ½ mi e Archer City, lcn for 5000-ft test.

Clay County—Bridwell Oil Co.'s Meyers 1, C. Thompson sur, 4 mi sw Blue Grove, mim for 5500-ft test.

COMPLETIONS

Archer County—L. T. Burns et al's Perkins-Shell 1, nw lot 27, blk 3, Denton CSL sur, missed Canyon pay, abnd 2702 ft.

Clay County—British-American O. P. Co.'s Stine 2, nw lot 2, blk 2, Parker CSL sur, abnd 1831 ft. L. W. Stanford et al's Jones 1, se MEP&P Ry. sur, A-350, abnd 782 ft.

Jack County—Paul Steed et al's Haag 1, N. P. Overby sur, A-452, abnd 3390 ft.

Wilbarger County—Amerada's Dodson 1-B, near nec se H&TC sec 34, blk 15, first Canyon producer for Fargo pool, td 4415 ft, perforated pipe 3982-4002 ft, flowed 113 bbls 41-gr oil 3 hrs, ½-in ch nat.

Young County—L. T. Burns et al's Leberman 1, nw sec 210, TE&L sur, abnd 891 ft. Kerlyn Oil Co.-Phillips Pet. Co.'s Dalrymple 1, se TE&L sec 1951, Strawn pay 2920-45 ft, pb from 2953 ft, flowed 228 bbls oil 12 hrs, nat, new pool. Kimmell, Lee & Co.'s Campbell 1-A, swc e½ n½ s½ TE&L sec 1371, pumped 30 bbls, initial, sand 954-60 ft, td 964 ft, new pool.

WYOMING

COMPLETION

Crook County—M. D. Miller's Commercial 1, sw se 19-49n-66w, Kara Terrace structure west of Wakeman Hills, northeastern Wyoming. Dry to 1240 ft. td. p & a.

William M. Barret, Inc.
Consulting Geophysicists
Specializing in Magnetic Surveys
Contracts accepted for domestic and foreign projects, using the most improved instrumental and interpretative technique.
GIDDENS-LANE BUILDING
SHREVEPORT, LOUISIANA

THE FORT WORTH LABORATORIES
Analysis of oil field brines, cores, gas, oil, and minerals. Field gas testing. R. H. Fash, Vice-President; Long Distance 138. 828½ Monroe Street, Fort Worth, Texas.

HOUSTON LABORATORIES
Analytical and Consulting Chemist
Podbielniak Gas Analysis
Oil Field Brines, Waters and Cores
Complete Evaluation of Crude Oils
Long Distance 267, Box 132, Houston, Texas

PATENTS
Patents, Trade Marks, Copyrights and Infringement Litigation
HARDWAY & CATHEY
428-29-30 Bankers Mortgage Bldg.
Phone Capitol 9756 — Houston, Texas

The Firm of
JACK A. SCHLEY
ATTORNEYS AT LAW
PATENTS - INFRINGEMENTS - OPINIONS
1801-3 Commerce Bldg. — Houston
1807-11 Tower Petroleum Bldg. — Dallas
San Antonio — Washington, D. C.

Shilstone Testing Laboratory, Inc.
Chemical Analyses
Oil, Water, Gas, Etc.
Boiler Water Treatment
Physical Test & Inspection
Houston — San Antonio — New Orleans
30 Years Experience

GULF COAST LABORATORIES
3513 Agnes St., Corpus Christi, Texas
Phone 6422
Manufacturers of Boiler Water Treatment Core Analysis
Complete Laboratory Service
Sales Offices . . . San Antonio and Houston

IDEAL SOUTHERN CALIFORNIA HEADQUARTERS FOR OIL MEN
★
HILTON HOTEL
(ON THE OCEAN FRONT)
LONG BEACH, CALIFORNIA
Rates: $2.50 up
Entertain your clients in the Hilton's Sky Room Terrace. Dining and Dancing. No cover or minimum charge.

MEN IN THE INDUSTRY'S NEWS

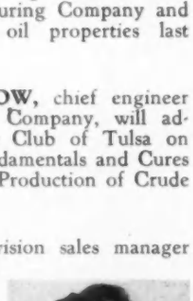
S. J. DICKEY, who joined General Petroleum Corporation 21 years ago as refinery engineer, has been named president, succeeding A. L. Weil, who retired last week after serving 30 years with the company. On graduating from the University of Pennsylvania in 1904 with a B. S. in mechanical engineering, Dickey joined United States Improvement Company, Philadelphia. He was appointed engineer and superintendent of Syracuse Lighting Company in 1912, and while with the company directed design, installation and operation of a toluene plant utilizing manufactured gas. During World War I, he was appointed by the Army Ordnance Division of the War Department to direct development of processes, design and installation of two Pacific Coast plants for production of toluene. In 1920 he was made chief engineer of General Petroleum Corporation, was elected a director in 1927, and in 1930 was made vice president in charge of manufacture.

Weil, an 1899 graduate of the University of California, drew up incorporation papers for General Petroleum Corporation and was general counsel at the time of its founding. He was one of the organizers of the Kettleman North Dome Association, organized to handle the first unit development in California's largest oil field.

BERT L. LIGON, 44, veteran North Texas operator and an active participant in the recent deep oil development, died January 6 at Wichita Falls, where he had resided since 1913. He was a native of Kerrville, Texas. Due to failing health, he disposed of his large stock interest in Wilson Manufacturing Company and a portion of his oil properties last summer.

CLARENCE GLASGOW, chief engineer for National Tank Company, will address the Engineers Club of Tulsa on January 13 on "Fundamentals and Cures for Gravity Loss in Production of Crude Oil."

H. L. PUTNAM, division sales manager for The National Supply Company at Fort Worth since 1939 has been transferred to Tulsa as assistant manager of The Oklahoma division. Putnam has been affiliated with the company since 1929, when he joined the sales staff at Torrance, California. In 1934, he was placed in charge of engine sales on the Pacific Coast, and continued in this capacity until his transfer to Houston in 1937 to engage in sales work in the Texas and Gulf Coast areas. In May, 1938, Putnam assumed charge of sales staffs in Texas as division sales manager.



FRED R. DAVIS, 64, a founder of the Audit Bureau of Circulations and advertising space buyer for General Electric Company, Schenectady, New York, for 35 years, died December 26 at his home after an illness of two years. Davis was a pioneer advocate of accurate measurement in advertising, and helped found the Audit Bureau of Circulations in 1914. He served as a director from that date until his death, and since 1927 had also been first vice president of the organization. A graduate of Worcester Polytechnic Institute with degrees of B.S. and M.S. in engineering, he entered the General Electric organization in 1901 as a test student, and in 1902 went to Fort Wayne, Indiana, as publicity manager of Fort Wayne Electric Company. In 1905, he joined the advertising department of General Electric Company in Schenectady.

ARCHIBALD W. LEONARD, 65, president of Devonian Oil Company, Tulsa, died January 7 at his home of a heart attack. He came to Tulsa in 1904 from Turkey City, Pennsylvania, and was then connected with the Devonian Oil Company. Later, he left that firm to organize the Oklahoma Natural Gas Company. In 1916, he was made a director of that company, and in 1922 became vice president. While in the employment of this firm, he was elected president of the Natural Gas Association of America. He was associated for many years in an advisory capacity with many gas projects in Oklahoma, Kansas and Texas. Leonard helped organize and was at one time president of Hinderliter Tool Company, and became president of the Devonian Oil Company two years ago following the death of J. H. Evans.

WILLIAM E. EGAN, manager of Oil Well Supply Company's Denver office, retired December 31 after 40 years of service with the company. He started with the company at Florence, Colorado. In 1921, he moved to Denver where he acted as sales representative and also supervised the Florence store until he was made manager of the Denver office in 1928.

PAUL C. DEAN, consulting geologist and producer, was elected president of the Fort Worth Geological Society, succeeding Ralph S. Powell, The Texas Company district geologist. C. L. Mohr, Ambassador Oil Corporation, and William J. Hilseweck, Gulf Oil Corporation, were named vice president and secretary-treasurer, respectively.

S. F. SHAW, San Antonio, discussed "The Application of Gas-Lift to Certain Types of Reservoirs and the Effect on Ultimate Recovery" before the South Texas Geological Society at San Antonio January 6.

HEATH M. ROBINSON, geologist, announces removal of his office from 1406 Gulf States Building to 1005 Gulf States Building, Dallas.

B. B. WILLIAMS resigned as president of The Cooper-Bessemer Corporation, Mount Vernon, Ohio, to become board chairman, succeeding E. J. Fithian, who resigned. Charles B. Jahnke, vice president and general manager for the past 2½ years, has been named president. Fithian, one of the founders of Bessemer Gas Engine Company and its president for several years, will continue as a director.

B. B. Williams

Williams, who will continue in an active capacity as head of the corporation, has been with The Cooper-Bessemer Corporation and its predecessor, C. & G. Cooper Company, for 40 years, starting as sales engineer. He was made secretary in 1912, became vice president and general manager four years later, and in 1920 was elected president. He retained that position when C. & G. Cooper Company was merged with Bessemer in 1929 to form the present corporation.

C. B. Jahnke

Jahnke joined the company in 1935 as chief engineer, and since July, 1937, has been vice president and general manager. A 1910 graduate of the University of Cincinnati, he was with Fairbanks, Morse & Company for 21 years, first as chief engineer and later as works manager of its plant at Beloit, Wisconsin. He joined International Harvester Company in 1931 to take part in their program of developing diesel engines for farm machinery.

SOL SMITH, petroleum engineer for the Railroad Commission of Texas, has been transferred from the Pampa to the Wichita Falls office. At present, he is in charge of the gas/oil ratio survey in the K-M-A field.

ORVILLE T. BARNETT has been named engineer of tests in the welding electrode department of The Metal & Thermit Corporation, New York. A chemical engineering graduate of Armor Institute of Technology, he was formerly associated with Carnegie Illinois Steel Corporation in its metallurgical control department, and later was with Black, Sivalls & Bryson, Inc., Oklahoma City, where he had charge of shop inspection. He will

EDWARD
High Pressure

Figure 2688

DROP FORGED STEEL VALVES

Trimmed with "EValloy" Stainless Steel

For pressures up to 6,000 pounds. Catalog No. 11-G, covering complete details on the Edward Valve line, sent you upon request.

GLOBE — ANGLE — BALL CHECK NEEDLE — METER

Large Stocks in sizes ⅛" through 2" carried in our Houston Warehouse.

MECO

MAINTENANCE ENGINEERING CORPORATION

P. O. Box 2637 Phone P-3135

HOUSTON, TEXAS, U. S. A.

"THE EXAMINATION OF FRAGMENTAL ROCKS"

by

Frederick G. Tickell

Professor of Petroleum Engineering at Stanford University

An outline of the physical properties of fragmental aggregates and of their mineral constituents, this book is a laboratory manual and guide for students, geologists, petroleum engineers, chemical engineers and microscopists —in fact for all those interested in a practical treatment either of identity or of size and shape relationships of fragmental rocks.

Fabrikoid Covering — 154 Pages

PRICE $4.00

Send orders to

THE GULF PUBLISHING CO.

P. O. Box 2608 Houston, Texas

MEN IN THE INDUSTRY'S NEWS

have charge of all electrode test work, including manufacturing control testing at Jersey City and East Chicago plants, as well as research work on uses and applications of electrodes.

R. E. FULLER and B. James Knight have been appointed to the Mid-Continent sales force of Fluid Packed Pump Company, Los Nietos, California, it has been announced by O. L. Frame, Southern Mid-Continent district manager. Fuller formerly was with Mid-Continent Supply Company, working out of Lake Charles, Louisiana, and Houston. Knight was formerly with W-K-M Company and Schlumberger Well Surveying Corporation.

LEO HORVITZ, of Subterrex, Inc., will discuss "Geochemical Well Logging" before the American Institute of Mining & Metallurgical Engineers, East Texas Section, at Kilgore, January 14.

E. E. ROSAIRE, of Subterrex, Inc., discussed "An Analysis of the Refraction Collapse of 1930" before the Houston Geological Society last week.

JAS. EMMETT, JR., has been appointed assistant sales manager of Jas. P. Marsh Corporation, Chicago. O. William Hage has been named manager of the company's gauge division, and E. C. Kluger manager of the heating division. All have been connected with the company for a number of years.

FRED ISAACS, manager of refineries for General Petroleum Corporation, and R. L. Minckler, assistant to the president, have been named to the company's board of directors.

R. L. (BOB) SLOAN, former assistant district production superintendent for Humble Oil & Refining Company at Gladewater, Texas, has been made district production superintendent in the Hawkins field, East Texas' latest boom area, where the company is confronted with a major drilling program.

J. A. DOWNEY, personnel director and safety engineer for Sloss-Sheffield Steel & Iron Company, Birmingham, Alabama, will discuss "Safety Engineering in Industry" before a district meeting of the American Society of Safety Engineers January 16 in Houston. The meeting will open at 8 p. m. in the Commerce Building.

LEWIS W. MacNAUGHTON, consulting geologist, was elected president of the Dallas Petroleum Geologists, succeeding W. W. Clawson, assistant chief geologist of Magnolia Petroleum Company. J. A. Lewis, Core Laboratories, Inc., and Fred E. Joekel, Magnolia Petroleum Company, were named vice president and secretary-treasurer, respectively.

RAY LEWIS has been named Houston district geologist for Stanolind Oil & Gas Company, succeeding Ira Brinkerhoff, who has gone with Standard Oil Company (Indiana) at Chicago. Lewis was formerly in San Antonio.

J. U. TEAGUE, superintendent for Hogg Oil Company, has been elected chairman of the Gulf Coast Section of the American Institute of Mining and Metallurgical Engineers. A graduate of Rice Institute, he was Gulf Coast division engineer for Humble Oil & Refining Company until December 1, 1939, when he became associated with Hogg Oil Company. Stuart E. Buckley, Humble Oil & Refining Company, is the new vice chairman, while Alexander Deussen, consulting engineer, was re-elected secretary-treasurer. New members of the board of directors are J. H. McEvoy, McEvoy Company, and R. R. Morse, Shell Oil Company. H. E. Treichler, Texas Gulf Sulphur Company, and George Sawtelle, Kirby Petroleum Company, are holdover directors.

JOSEPH L. McHUGH, former oil company executive of Shreveport and Jennings, Louisiana, has been appointed director of the Louisiana Department of Minerals.

Under a reorganization plan adopted by the 1940 Louisiana legislature, and ratified by a referendum vote, the Louisiana Conservation Commission will hereafter not handle minerals, but only wild life, oysters, fish and forestry. The Department of Minerals also will absorb the functions of the former state minerals board, bringing the entire oil industry in Louisiana under this department.

G. A. POOLE, West Texas district production engineer for Gulf Oil Corporation, was seriously injured January 7 in an auto mishap near Big Spring, while en route to his Odessa home after attending a Texas Railroad Commission hearing at Austin.

A. H. d'ARCAMBLE, consulting metallurgist and sales manager for Pratt & Whitney Company, Hartford, Connecticut, discussed "Machinability of Metals" before a joint meeting of the American Society for Metals and the American Society of Tool Engineers last week at Houston.

EDGAR B. DAVIS, Southwest Texas operator formerly engaged in the rubber industry, will discuss "Rubber and the Petroleum Industry" before the South Texas Geological Society, meeting Monday noon, January 13, in San Antonio.

EDMOND H. NEWHAM, 74, founder of Newham Oil Company and more lately with the Cushing Refinery, died at his home in Cushing January 1.

N. T. GILBERT, manager of Mid-States Oil Corporation, Tulsa, has been elected vice president of the Louisiana & Northwestern Railroad.

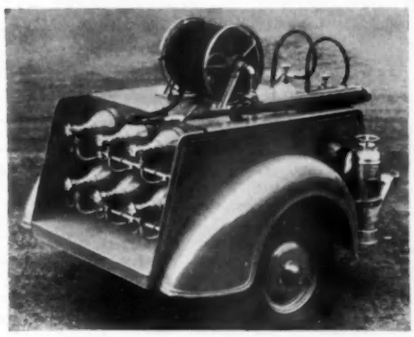
NOTES FOR THE Equipment Buyer and User

Fire-Fighting Unit

WALTER KIDDE & COMPANY

A portable fire-fighting unit, designed to be hooked up as a trailer for emergency use and carrying six 50-pound carbon dioxide cylinders, a hose reel and nozzle, has been announced by Walter Kidde & Company, Bloomfield, New Jersey.

Cylinders, manifolded together, are individually operated by valves on each



Kidde Portable Fire-Fighting Unit

cylinder, permitting employment of all or any part of the unit's capacity on a large or a small fire. Carbon dioxide is discharged through 100 feet of ½-inch hose, fed through a trunnion-type manifold. Control of the discharge may be made by a shut-off valve on the nozzle handle, permitting discharge to be interrupted while operator is maneuvering for position against a blaze.

For smaller fires, two portable carbon dioxide extinguishers of 15 pounds capacity are carried on the front platform of the trailer. Also two 2½-gallon pure-water extinguishers which operate on the principle of a syphon bottle, each containing a small cartridge of carbon dioxide which is released when the extinguisher is inverted, and which propels a water stream 30 to 40 feet.

Transformer

WAGNER ELECTRIC CORPORATION

A transformer, designated Noflamol and employing a non-inflammable synthetic liquid for transformer oil, has been announced by Wagner Electric Corporation, 6400 Plymouth Avenue, St. Louis.

The units are designed for installation indoors without use of fireproof vaults.

Liquefied Petroleum Gas Meters

American Meter Company, New York, has issued Catalog LPG-4 describing its line of liquefied petroleum gas meters. A section is devoted to specifications for ordering liquefied petroleum gas meters.

Gas Regulators

Fisher Governor Company, Marshalltown, Iowa, has issued Bulletin 43-D, describing, illustrating and pricing its line of gas service regulators, safety shut-off service regulators, field regulators and low-pressure test gauges. It gives complete details and all specifications with capacity and regulation curves on the company's Types 730, 730H, 733A and 733AB house service gas pressure regulators; information on Types 738, 739 and 799A safety shut-off gas service regulators; on Type 630, a pounds-to-pounds large-capacity reducing regulator; and on Type 726 high-pressure field regulator, Type BB self-contained pressure regulator, Type 57H high-pressure gas regulator, Type 289A diaphragm safety release valve, and the company's low-pressure tent gauge.

Filter

STAYNEW FILTER CORPORATION

A water filter employing radial fin construction, designated Model CPHLS, has been announced by Staynew Filter Corporation, Leighton Avenue, Rochester, New York.

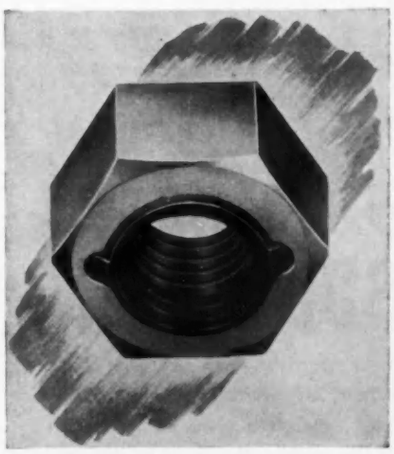
In operation, water passes through fabric filter mediums designed for minimum restriction to water flow. A filter insert, measuring 11 inches high by 8¼ inches in diameter, provides an active filtering area of 1325 square inches. The filter has no moving parts, and is designed for long periods of operation without attention. The insert may be removed by unbolting the head and removing one wing nut, and units may be arranged so that cleaning is effected by backwashing with clean water.

Lock Nut

SECURITY METAL PRODUCTS, INC.

A lock nut, designed for repeated application without losing its gripping power, has been introduced by Security Metal Products, Inc., 374 East Kalamazoo Avenue, Kalamazoo, Michigan.

The gripping element consists of a slightly elliptical-shaped spring-steel retainer, permanently sealed in the head of a standard nut. The retainer is distorted to circular shape by the bolt.



Security Metal's Lock Nut

Photo-Electrode Control

THE BROWN INSTRUMENT COMPANY

A method of protection against failure of oil, powdered coal and luminous gas flames, designated Protectoglo photo-electrode system, has been announced by The Brown Instrument Company, Wayne & Roberts Avenues, Philadelphia.

It employs a photo-electric principle

Brown's Photo-Electrode Control

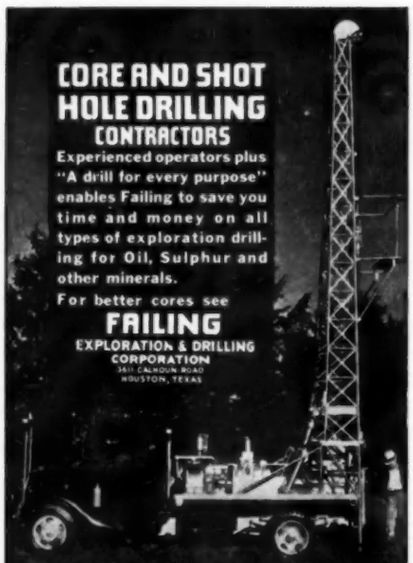
that avoids the necessity of placing a metallic electrode in the flames. The system detects presence of a flame by means of light emitted when a burner is in normal operation.

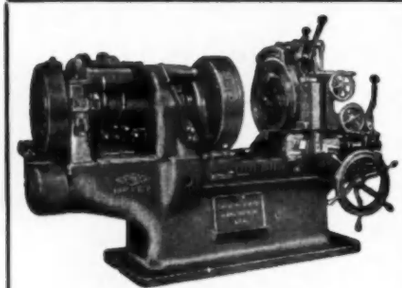
The heart of the system is a light-sensitive device. In operation, light from the flame is directed upon a photo cell, resulting in a small flow of current through the cell which is amplified by a vacuum-tube circuit until of sufficient magnitude to close a relay. Through the relay contacts, the main fuel valve is energized.

Response of the system to flames of different luminosity may be changed on the job by means of a sensitivity adjustment. With the adjustment in the maximum position, the unit will respond to the light of a candle, while at the other extreme, with the adjustment at the minimum position, no amount of light will close the relay.

To prevent transient flame disturbances from causing unnecessary shutdowns, the system has been designed to provide a time lag in the relay operations, provided by the discharge of a small capacitor at the right of the sensitivity adjustment. The unit is designed so the time lag bears a direct relation to flame luminosity and to the setting of the sensitivity adjustment. For a given sensitivity setting, time lag is designed to increase with an increase in light intensity of the flame. Similarly, if the light intensity remains constant, increasing the sensitivity will also increase the time lag. The lag may be varied from zero to a maximum of 10 seconds.

The relay is de-energized whenever the door is opened by a door switch connected in series with the relay coil. High-impedance components of the cir-


CORE AND SHOT
HOLE DRILLING
CONTRACTORS
Experienced operators plus "A drill for every purpose" enables Failing to save you time and money on all types of exploration drilling for Oil, Sulphur and other minerals.
For better cores see
FAILING
EXPLORATION & DRILLING CORPORATION
3611 CALHOUN ROAD
HOUSTON, TEXAS



New Landis 4¼ Receding Chaser Pipe Threading Machine

COMPLETE LINES

Machine Tools—Metal Working Machinery—Bolt and Pipe Threading Machines—Electric Arc Spot and Butt Welders—Hand Power and Electric Traveling Cranes—Foundry and Forge Shop Equipment.

C. J. HARTER, Machinery

4000 Clay, Houston, Texas
Fairfax 1466

OIL BOOKS

The knowledge gained through years of work and study by some of the most capable men in the oil industry is set down in the various oil books published and sold by the Gulf Publishing Company.

THE GULF PUBLISHING COMPANY
P. O. Box 2608 Houston, Texas

NOTES FOR THE Equipment Buyer and User

cuit, including the base and socket of the photo cell, are supported on isolantite insulation.

The unit is supplied with a swivel mounting that can be screwed to a length of 1¼-inch pipe supported from the floor. The advantages of such a mounting are described as isolating the unit from the heat of the burner and furnace wall, and providing a ready means for sighting on the flame.

The system is designed to protect a luminous flame against explosion hazards. It is supplied for 115 volts, 25 to 60 cycles, inclusive. It is furnished as a cut-off model, for manual restarting.

Welding

"Oxy-Acetylene Tips," house magazine of Linde Air Products Company, 30 East 42 Street, New York, in its January issue, published an article on "Instruction Outline for Bronze-Welding Cast Iron," supplemented by a description of bronze-welding a broken gear spoke.

Abercrombie Pump's Types D and F Pressure Gauges

Pressure Gauge

ABERCROMBIE PUMP COMPANY

A pressure gauge designed for core drills, cementing pumps, and acidizing pumps, designated Type F, has been announced by Abercrombie Pump Company, Gulf Building, Houston. It is described as suitable also for boiler-feed-pump service, gathering-line pumps, and water-supply systems.

The gauge, duplicate in design and construction to the company's Type D, designed for rotary drilling service, is mounted on a heavy forged steel sub and screws directly onto 1-inch pipe. The case is filled with oil, in which all working parts operate to minimize corrosion and wear. Dial and working parts are cushioned against vibrations and frosting of the gauge window, made of Plexiglass. The design prevents mud, water, oil, air, gas or any other liquid being measured from entering the gauge unit.

Issue Revised Edition of East Texas Field Directory

The East Texas Oil Field Directory, published by G. E. Wimberly, Kilgore, is now available in a revised edition, covering 932 operating units in the East Texas field. Headquarters and the name and address of the field superintendent of each concern are enumerated along with total producing leases and wells. Similar information is listed for Talco, Sulphur Bluff and the Texas portion of the Rodessa field. Added features include active drilling contractors, pipeline companies and operators of natural gasoline plants and refineries.

Republic Supply Company Sells Pipe Department to Youngstown

Republic Supply Company of California has sold its oil country tubular department, together with its Wilmington (California) pipe yard to The Youngstown Steel Products Company. Republic Supply Company will continue in the general oil-well supply business, maintaining main office, warehouse and shop in Los Angeles and 15 branch stores throughout the California oil fields.

J. A. Crawford, J. W. Schmid, and L. B. Wiggins, former officers and directors of Republic Supply Company, together with R. I. Whelan and G. E.

Welcome...HOTEL PITTSBURGHER

★ ★ Rates ★ ★
SINGLES $3 TO $4
DOUBLES $4.50 TO $6

. . . Pittsburgh's Newest Hotel 400 rooms, all with radio at no extra cost, outside view & bath.

A KNOTT HOTEL ★ JOSEPH F. DUDDY, Manager

NOTES FOR THE Equipment Buyer and User

Pitts have resigned to join The Youngstown Steel Products Company. Crawford is being succeeded as president of Republic Supply Company by T. H. Beament. W. L. Duhig has been named vice president and manager of sales; A. G. Fraser, manager machinery department; J. J. Pike, manager of purchases and stores; A. B. Ripley, treasurer; H. W. Wright, general counsel; and P. M. Pike, a member of the board along with the others named.

Youngstown Steel Products Company will be exclusive distributor of Youngstown oil country pipe in California.

Wm. B. Scaife & Sons Change Firm Name

Wm. B. Scaife & Sons Company, Oakmont, Pennsylvania, has changed its firm name to Scaife Company. The change, made for simplification, does not affect corporate structure of management of the company.

Organized in 1802 by Jeffery Scaife, the original shop was in what is now downtown Pittsburgh. The name, Wm. B. Scaife & Sons was first used in 1871, and "Company" was added in 1901. In 1892, the plant was moved to Oakmont, suburb of Pittsburgh.

Motor Starter

General Electric Company, Schenectady, New York, has issued Bulletin GEA-2964B describing its D-51 magnetic motor starter. Series of photographs describe a new connection system designed for easy wiring, show how movable contacts are removed and replaced, describe how an isothermic overload relay protects motor, and illustrate other design features.

Thermocouple Pyrometers

Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia, has issued Catalog E-33A-503, giving 28 pages on "Apparatus for Checking Thermocouple Pyrometers in Plant and Laboratory." It illustrates and describes portable equipment for plant tests under actual operating conditions, and laboratory apparatus to standardize it. Recommendations are included to aid pyrometer users in choosing checking apparatus best suited to their needs.

Compressors

Worthington Pump & Machinery Corporation, Harrison, New Jersey, has issued Bulletin L-611-B-A, describing its Types HB-2 and HS-2 single horizontal two-stage compressors. The units, steam or motor driven, are equipped with feather valves consisting of three parts, strip, seat and guard.

Gas Meters

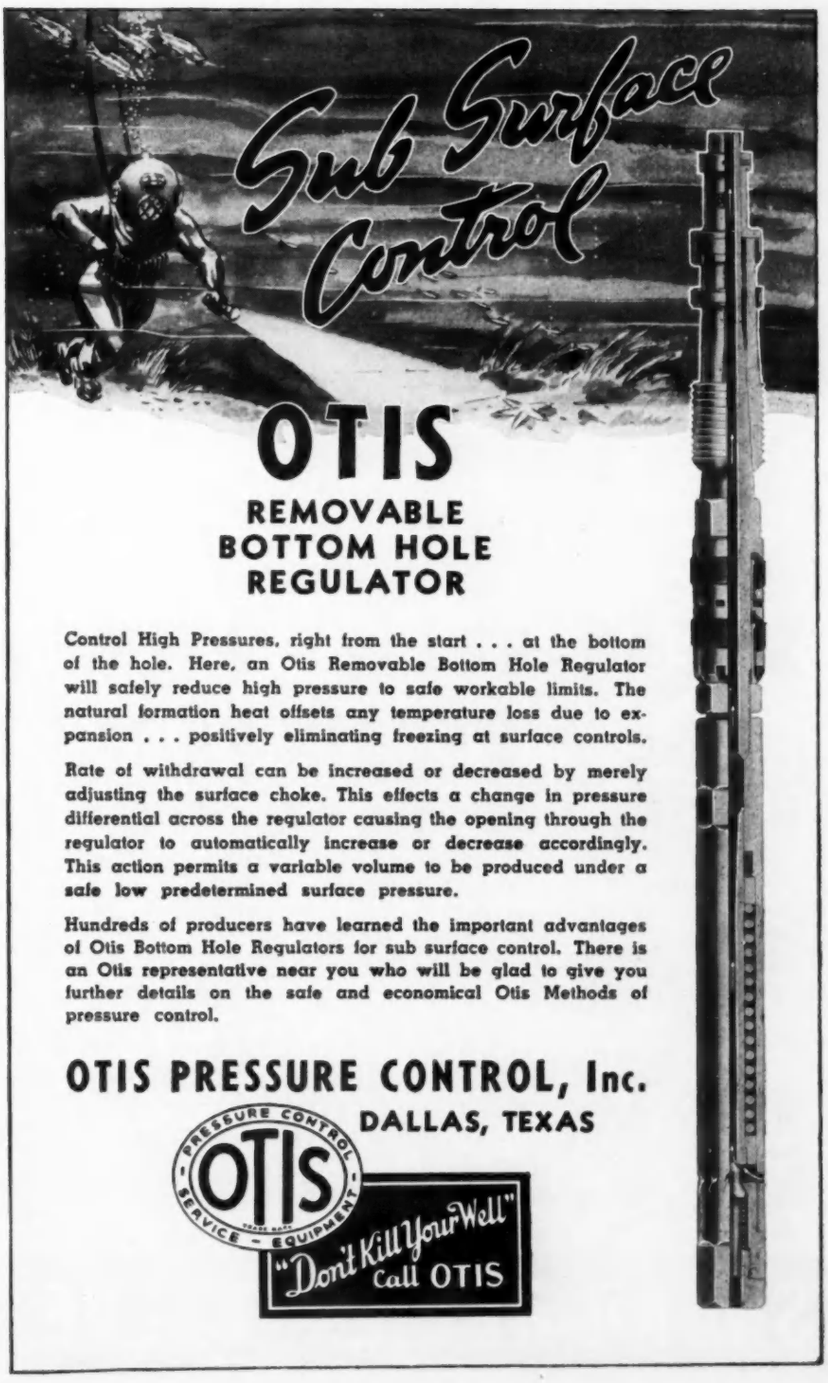
Pittsburgh Equitable Meter Company, 400 North Lexington Avenue, Pittsburgh, has issued a bulletin on "Repair and Maintenance Manual for Emco and Ironclad Displacement Gas Meters." The publication, containing 80 pages, is written in non-technical language and contains over 80 photographs. Distribution is being restricted to meter shop foremen, distribution superintendents and measurement engineers.

Flow Meter

American District Steam Company, North Tonawanda, New York, has issued Folder 140 describing its Adsco orifice-type flow meter for steam, water, air or gas. It illustrates and describes construction of the meter, which can be supplied with recording chart, indicating scale and integrating counter to totalize the flow, or in combinations of the three devices.

Screw Pump

Quimby Pump Company, 340 Thomas Street, Newark, New Jersey, has issued Bulletin S-203, describing its gear-in-head type screw pumps. The pump has two moving parts, consisting of two parallel shafts, on each of which are mounted and secured two screws and a timing gear. Rotating elements fit into a cylinder with intersecting bores, and each screw fits into the spiral groove in the opposite screw so as to form a seal. Shafts are driven in opposite directions by timing gears, and there is a slight clearance between the screws themselves and between the screws and the cylinder. The bulletin gives a selection chart for estimating purposes, with additional tables showing approximate dimensions of pumps for horizontal bulkhead and pedestal mounting.


Sub Surface Control
OTIS
REMOVABLE
BOTTOM HOLE
REGULATOR
Control High Pressures, right from the start . . . at the bottom of the hole. Here, an Otis Removable Bottom Hole Regulator will safely reduce high pressure to safe workable limits. The natural formation heat offsets any temperature loss due to expansion . . . positively eliminating freezing at surface controls.
Rate of withdrawal can be increased or decreased by merely adjusting the surface choke. This effects a change in pressure differential across the regulator causing the opening through the regulator to automatically increase or decrease accordingly. This action permits a variable volume to be produced under a safe low predetermined surface pressure.
Hundreds of producers have learned the important advantages of Otis Bottom Hole Regulators for sub surface control. There is an Otis representative near you who will be glad to give you further details on the safe and economical Otis Methods of pressure control.
OTIS PRESSURE CONTROL, Inc.
DALLAS, TEXAS
PRESSURE CONTROL
OTIS
SERVICE - EQUIPMENT
"Don't Kill Your Well" Call OTIS

Southwest Texas

[Continued from page 55]

Stanolind Oil & Gas Company opened a second sand, 1900 feet deeper than the discovery pay, in the Riverside field of Nueces County, when Thompson 2 made a gas well spraying 3 barrels of distillate per day through 3/16-inch choke. Pressures were 950 pounds, equalized. The well had been plugged back from 7750 feet and after several tests at various levels started flowing from 6981 feet. It is one mile north of the main field.

Colorado County Discovery

Colorado County's second field discovery in the Wilcox zone was assured with W. R. Davis & Company's Brownson 1-A flowing at the rate of 125 barrels of fluid per day through 3/16-inch choke under 2450 pounds working pressure. Perforations had been made at 9423-35 feet, the well being plugged back from 10,012 feet. This well is about 2 miles westerly from the shallower gas and oil wells in Garwood field.

The well was flowing mud, wash water and 83 percent 49.3-gravity oil at last reports. The flow was slow in clearing, but it is believed that it will be making clean oil within the next few days.

A second wildcat along the South Texas trend to indicate production is McMurrey Refining Company's test on the Allen and Miner land in Lavaca County. The well is on the Vienna prospect and is bottomed in sand at 8524 feet where the string of casing was set. Perforations are due to be made as soon as weather permits moving in the truck.

Dimmitt Well to Make Pumper

Chittim Anticline apparently gained its first producer in the Navarro series with 31-gravity oil being swabbed from Producers Corporation of Nevada et al's McKnight & Bennett 1 near Carrizo Springs in Dimmitt County. The well opens the first production in the county.

This wildcat is in the Olmos sand, Navarro series, at 2944½-98 feet with casing landed at 2941 feet. At last reports, it was swabbing at the rate of 4 to 6 barrels of fluid per hour, mostly oil and a little drilling mud, the fluid level standing constantly at 500 feet. Pressure was light, apparently insufficient to cause the well to flow steadily, but a pumping well of several hundred barrels per day is indicated.

The wildcat, in Section 653, is the first producer in the shallower sands on the Chittim Anticline. This regional structural feature extends through Kinney, Maverick, Zavalla and Dimmitt counties and is looked upon as a major producing possibility.

Harry Ezzell's Fee 44 made a gasser capable of several million cubic feet per day from the Loma Novia sand to expand the South Calliham field of McMullen County 1½ miles southwest. The sand was encountered at 1221 feet, but the hole was drilled to 1546 feet, then plugged back. This discovery further expands a reserve which is growing in importance.

North Rincon field of Starr County was being further expanded as a new producer was being finished in Sun Oil Company's G. H. Coates 1, Section 515. The well is 3573 feet west of Saenz-State 1, north extension well, and northeast of W. G. Lehr 1, field discovery. It had been drilled to 5213 feet, but was plugged back to just above 4400 feet. Production will be attempted in sands at 4313-23 feet and 4388-92 feet.

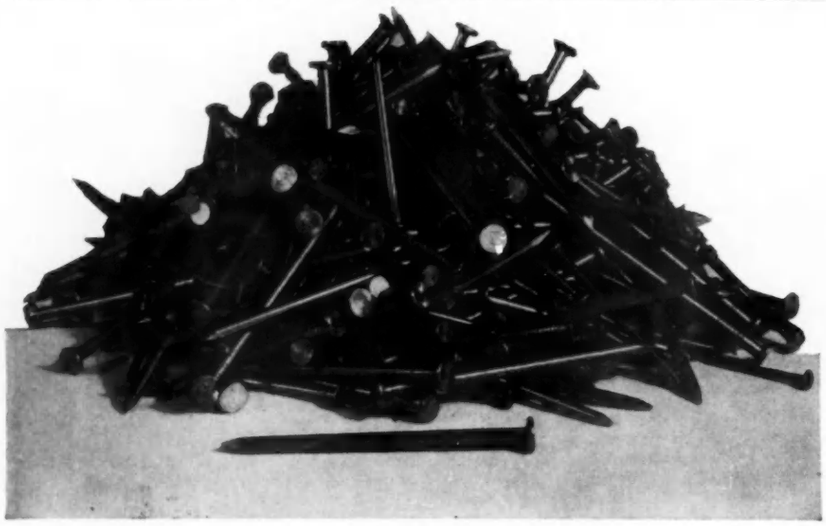
Two rigs are running in the Willamar area in Willacy County. Pan American Production Company's Willamar 1-B, 1100 feet southeast of the discovery, is below 7500 feet, while Kent 1, one mile west of production, has set 2900 feet of surface casing and is drilling.

Jack Giblin and Gust Tsesmelis' Holzapfel 1, Section 178, and in northeastern Duval County, is testing a shallow Mirando oil sand at 1088-1103 feet. The test had been drilled to 1203 feet, plugged back and 4-inch casing was landed at 1128 feet. The well is on the Munson-Adami trend.

Ask Saxet Exemption From Proration Shutdown

Operators with wells producing from the Frio sand in the Saxet field, Nueces County, have requested exemption from shutdowns. At a hearing before the Texas Railroad Commission last week, they presented evidence to show that the large volumes of water produced are damaging the wells, and that they could be more efficiently operated if produced continuously.

Testimony of C. A. Warner, petroleum engineer for Houston Oil Company, indicated that water is found in several sands between 5300 and 7200 feet. He was of the opinion that all wells now making 85 percent of water or more, should be exempt from shutdowns.



Include 10c in your 1941 Budget for these

SHEAR-RELIEF VALVE REPAIR PARTS

Showing high pressure type for slush pump and flow-line service. Made also in low pressure type for small pump service.

Rising prices haven't affected common nails. They're the same as last year . . . roughly 5c a pound. SHEAR-RELIEF Valve Repair Parts, therefore, haven't gone up, and a dime in your 1941 budget should cover your maintenance cost this year for protecting slush pumps, pump parts and rotary hoses against excess pump pressures, since the nail is the only damaged part when the SHEAR-RELIEF Valve functions to relieve otherwise hazardous pressures.

Any member of the crew easily resets the SHEAR-RELIEF Valve by merely following directions on the valve name-plate while inserting another nail. It's as simple as that, and it's being done in oil fields everywhere.

Full details in your Composite Catalog

FLUID-PISTON SLUSH PUMPS
ABERCROMBIE PUMP CO.

Gulf Building Houston, Texas

SHEAR-RELIEF VALVE

Squeaks from the Bull Wheel

"Welting the Maid"

The following copy of an early eighteenth-century shoemaker's bill (relating to repairs for a family for the year from November, 1708, to December, 1709) appeared recently in The Church Times, the paper having received it from the Rev. K. E. N. Lamplugh, of Hartley Wintney, Hants:

	s.	d.
Clogging up Miss		10
Mended up Miss		2
Toe capped Master		3
Turned up, clogged up, and mended Maid	1	6
Lined, turned up and put a piece in Madam	4	6
Soleing and covering the Maid		6
Tapping Madam		6
Putting a piece in Madam		6
Stretching and easing little Master		7
Welting and stretching the Maid		10
Mending and Patching the Cook		6
	£0	10 8

—Reprinted from The Naft Magazine, published by Anglo-Iranian Oil Company, Ltd.

Attention

"The new patient in Ward B is very good looking," said the nurse.

"Yes," agreed the matron, "but don't wash his face. He's already had that done by four nurses this morning."

Imperative

Indignant Parent (6 a.m.)—Young man, what do you mean by bringing my daughter in at this hour.

Flaming Youth—Well, I gotta be at work by seven.

Even Up

First Actress—What did you do with your cigarette testimonial money?

Second Actress—I had my throat doctored.

A Safety Measure

"I met my wife in a funny way—ran over her with my car, and later married her."

"If that happened more often, there wouldn't be so much reckless driving."

As She Is Spoke

Professor, the undergraduates claim that your language is too pedantic an unintelligible.

Impossible! Why, sir, to employ a vulgarism, perspicuity is my penultimate appelation.

Don't Look Now

Fiddler—The leading lady seems to have a break in her enunciation.

Orchestra Leader—Keep your eyes on your music.

Disappointed

Auntie, were you ever in a predicament?

No, dear, but heaven knows I've tried.

Sold

The salesman punched the doorbell and was greeted by a spinster. "I represent the Tightfit Wool Company," said he. "Would you be interested in coarse yarns?"

A hopeful look came into the eyes of the spinster, as she breathed in reply: "Of course. Tell me a couple."

Playing Safe

An old maid went to have her picture taken, and the photographer noticed her tying a piece of clothes-line around the bottom of her skirt.

"What's the idea of that?" he asked. "I can't take your picture that way."

"You can't fool me, young man," said the old girl. "I know you see me upside down in that camera."

Not Complimentary

"What are 'ancestors'?"

"Well, dear, I'm one of your ancestors, and your Grandpa is another."

"Then, Daddy, why do people brag about them?"

Misunderstood

Mistress: "You will often have to help the other maid upstairs."

New Maid: "Why? Does she drink?"

Incomprehensible

"For the last time, Betty, I tell you that you cannot have another penny."

"I can't understand why Daddy says you're always changing your mind."

Whose Car?

"How is that young man with whom you fell in love at first sight?"

"Oh, he was a fraud. It was his boss' car that he was in."

Discouraged

The English vicar advertised for a manservant and the next morning a well-dressed young man rang the bell.

"Can you light the fire and get breakfast for 7 o'clock?" he asked.

"I think so," replied the man.

"Can you polish the silver, wash the dishes and keep the house neat and tidy?"

"Really, Vicar," said the young fellow, "I came to see you about getting married, but if it's as much work as all that you can count me out right away!"

Provocation

McGinn appeared before the magistrate on a charge of assault and battery, the charge having been brought by Kelly. The magistrate was attempting to get both sides of the story and asked McGinn what induced him to administer such a terrible beating to the plaintiff.

"Sir," said McGinn, "suppose a man called you a dirty Irish scallywag—what would you do?"

Said the magistrate with a smile, "But I'm not Irish!"

"Well," responded McGinn, "suppose he called you the kind of dirty scallywag that ye are?"

All Told

A young mother asked her butcher to weigh the baby. "With pleasure, madam." Then, having examined the scales, "Thirteen and a half pounds, with the bones."

French with Tears

An Englishman spending a holiday in Paris was endeavouring to work off some of his French in a cafe.

"Garsong," he said, after a lengthy study of the menu, "je desir Consomme Royal et un piece of pang et burr . . . no, hang it! . . . une piece of pang."

The waiter said helpfully, "I'm sorry, sir, I don't speak French."

"Very well," snapped the diner irritably, "for heaven's sake send me someone who can!"

Same Buttons

Visitor: "What nice buttons you are sewing on your little boy's suit. My husband once had some like that on a suit."

Minister's Wife: "Yes, I get all my buttons out of the collection plate."

QUALITY ELECTRIC STEEL CASTINGS

Do you know that DEDMAN has a personnel of STEEL Specialists who are experienced in making

ELECTRIC STEEL CASTINGS

. . . that meet the manufacturers' most exacting requirements?

DEDMAN

FOUNDRY & MACHINE CO.

HOUSTON, TEXAS

"You need quality Castings . . . quality demands DEDMAN Castings"

INDEX TO ADVERTISERS

*** Indicates that detailed information on the manufacturer's products or services may be found in the 1940 edition of the Composite Catalog of Oil Field & Pipe Line Equipment.**

A — Page

*Abercrombie Pump Co. ... 70
*Acme Fishing Tool Co. ... —
*Advanced Petroleum Equipment Corp. ... —
Air Reduction Sales Co. ... 4
*Ajax Iron Works ... —
*Alten's Foundry & Machine Works ... —
*Aluminum Company of America ... —
Aluminum Ore Co. ... —
American Assn. of Petroleum Geologists —
*American Cable Division of American Chain & Cable Co. ... —
American Cast Iron Pipe Co. ... —
*American Hammered Piston Ring Division of Koppers Co. ... —
*American Iron & Machine Works Co. ... —
*American Meter Co. ... —
*American Sand-Banum Co. ... —
*American Steel & Wire Co. ... —
Atlas Drop Forge Co. ... —
Atlas Supply Co. ... —
*Axelson Manufacturing Co. ... 29

B

*Baash-Ross Tool Co. ... 3
*Baker Oil Tools, Inc. ... 2
Baldwin De La Vergne Sales Corp. ... —
*Baldwin-Duckworth Division of Chain Belt Co. ... —
*Baroid Sales Division ... —
William M. Barret, Inc. ... 64
*The Barrett Co. ... —
*Bartlett-Hayward Division of Koppers Co. ... —
*Bethlehem Steel Co. ... —
*Bethlehem Supply Co. ... —
*Braden Steel Corp. ... —
*The Brewster Co. ... —
The Bridgeport Machine Co. ... —
*Broderick & Bascom Rope Co. ... —
*Brown Oil Tools, Inc. ... —
*The Buckeye Traction Ditcher Co. ... —
Bucyrus-Erie Co. ... —
*The Buda Co. ... —
*Butler Manufacturing Co. ... —
*Byron Jackson Co. ... —

C

Jo H. Cable ... —
*Cameron Iron Works ... —
*Cardwell Manufacturing Co. ... —
Carnegie-Illinois Steel Corp. ... —
*J. I. Case Co. ... —
*Caterpillar Tractor Co. ... 30-31
*The Cavins Co. ... —
*Chain Belt Co. ... —
*Clark Bros. Co. ... —
*Climax Molybdenum Co. ... —
*Coffing Hoist Co. ... —
Columbian Steel Tank Co. ... —
*Continental Motors Corp. ... —
Continental Oil Co. ... —
The Continental Supply Co. ... 6
*Fred E. Cooper Co. ... —
*The Cooper-Bessemer Corp. ... —
*Crane Co. ... —
W. H. Curtin Co. ... —

D

*Darling Valve & Manufacturing Co. ... —
Dedman Foundry & Machine Co. ... 71
*Diamond Chain & Manufacturing Co. ... —
*Dixon Valve and Coupling Co. ... —
*Dowell Incorporated ... —
*The Dragon Manufacturing Co. ... —
*E. I. du Pont de Nemours & Co. ... —

E

*Eastman Oil Well Survey Co. ... —
Economy Electric Lantern Co. ... —
Elastic Stop Nut Corp. ... —
*Engineering Laboratories, Inc. ... —

F

Failing Exploration & Drilling Co. ... 68
First National Bank in Houston ... —
First National Bank & Trust Co. of Tulsa —
Fluid Packed Pump Co. ... —
Ford Motor Co. ... —
The Fort Worth Clearing House Association ... —
The Fort Worth Laboratories ... 64
Fort Worth Steel & Machinery Co. ... —
*Franks Manufacturing Corp. ... —
Frick-Reid Supply Corp. ... —
Frost National Bank ... —

G

*Gardner-Denver Co. ... —
*The Garlock Packing Co. ... —
*Gaso Pump & Burner Manufacturing Co. —
*Gatke Corp. ... —
*General Electric Co. ... —
General Geophysical Co. ... —
General Motors Sales Corp. ... —
Geological Scientific Service Co. ... —

Page

Goetze Gasket & Packing Co. ... —
*Goodyear Tire & Rubber Co. ... 1
*H. P. Gott Manufacturing Co. ... —
*Gray Tool Co. ... —
*Green Head Bit & Supply Co. ... —
*The Guiberson Corp. ... —
Gulf Coast Laboratories ... 64
Gulf Envelope Co. ... —
Gulf Oil Corp. ... —
Gulf Publishing Co. ... —
Gunter Hotel ... —

H

*Halliburton Oil Well Cementing Co. ... —
Hardway & Cathey ... 64
C. J. Harter, Machinery ... 68
*Haynes Stellite Co. ... —
*Hazard Wire Rope Division of American Chain & Cable Co. ... —
Heldie's Machine Works ... —
The Hercules Powder Co. ... —
*Hewitt Rubber Corp. ... —
Hilton Hotel ... 64
*Hobbs Manufacturing Co. ... —
Hollywood Plaza Hotel ... —
Houston Laboratories ... 64
Houston Pipe Appliances Co. ... —
*Hughes Tool Co. ... First Cover
Humble Oil & Refining Co. ... —
*Hunt Tool Co. ... —
Hyatt Bearings Division ... —

I

Independent Exploration Co. ... 42
*Ingersoll-Rand Co. ... —
*International Harvester Co. ... —
*The International Nickel Co. ... 41

J

Jarecki Manufacturing Co. ... —
*Jensen Brothers Manufacturing Co. ... —
*Johns-Manville ... —
*M. O. Johnston Oil Field Service Corp. —
*Jones & Laughlin Steel Corp. ... —

K

*Kerotest Manufacturing Co. ... —
*Keuffel and Esser Co. ... —
*Kibele Manufacturing Co. ... —
*Kinzbach Tool Co. ... —
*Koppers Co. ... —

L

Landis Machine Co. ... —
*Lane-Wells Company ... 5
*Larkin Packer Co. ... —
The Thomas Laughlin Co. ... —
*The Layne & Bowler Co. ... —
Lebanon Steel Foundry ... —
*Le Roi Co. ... —
*A. Leschen & Sons Rope Co. ... —
*The Lincoln Electric Co. ... —
*Line Scale Co. ... —
*Link Belt Co. ... —
Lone Star Cement Corp. ... Second Cover
*Lucey Boiler & Manufacturing Co. ... —
*Lucey Export Corporation ... —
*The Ludlow Valve Manufacturing Co. ... —

M

Macwhyte Co. ... —
*Maintenance Engineering Corp. ... 66
P. R. Mallory & Co., Inc. ... —
The Marley Co. ... —
Marmon-Herrington Co. ... —
*John N. Martin, Manufacturer ... —
*McEvoy Co. ... —
McKissick Products Corp. ... —
*Merco Centrifugal Co. ... —
*Merco Nordstrom Valve Co. ... —
*Meria Tool Corp. ... —
*Metric Metal Works ... —
*Miller Sand Pump Co. ... —
*Minneapolis-Moline Power Implements Co. —
*Mission Manufacturing Co. ... 32
*Morse Chain Co. ... —
Mott-Smith Corp. ... —
The Jno. Muller Co. ... —

N

National Bank of Tulsa ... —
*National Lead Co. ... —
The National Supply Co. ... 26-27
National Tube Co. ... —
Nicholson File Co. ... —
Norvell-Wilder Supply Co. ... —
*Novo Engine Co. ... —

O

*Oil Center Tool Co. ... —
*Oil City Brass Works ... —
Oil Industry Mailing List Co. ... —
Oil Well Supply Co. ... —
*Otis Pressure Control, Inc. ... 69

P — Page

*The Parkersburg Rig & Reel Co. ... —
*Patterson-Ballagh Corp. ... —
*Pelican Well Tool & Supply Co. ... 57
Petroleum Electric Power Assn. ... —
Petroleum Rectifying Co. of California ... —
*Pittsburgh Equitable Meter Co. ... —
*Pittsburgh Steel Co. ... —
Hotel Pittsburgher ... 68
Plymouth Cordage Co. ... —

Q

*Quaker Rubber Corp. ... —

R

Reading-Pratt & Cady Division of American Chain & Cable Co. 39
*Rector Well Equipment Co. ... —
*Reda Pump Co. ... —
*Reed Roller Bit Co. ... —
*Regan Forge & Engineering Co. ... —
Republic National Bank ... —
*Republic Steel Corp. ... —
*The Ridge Tool Co. ... —
John A. Roebling's Sons Co. ... —

S

Safety Gas Main Stopper Co. ... —
Jack A. Schley ... 64
*Schlumberger Well Surveying Corp. ... —
The Second National Bank of Houston ... —
*Security Engineering Co. ... —
Seismic Exploration Co. ... —
Seismograph Service Corp. ... —
*Shaffer Tool Works ... —
Shell Development Co. ... 23
Shell Oil Co., Inc. ... —
Shilstone Testing Laboratory, Inc. ... 64
*SKF Industries, Inc. ... —
A. O. Smith Corp. ... —
*E. M. Smith Co. ... —
*South Chester Tube Co. ... —
Southern Engine & Pump Co. ... —
Southern Pacific Lines ... —
Spang Chalfant, Inc. ... —
*Spang & Company ... —
*Sperry-Sun Well Surveying Co. ... —
Standard Supply and Hardware Co. ... —
*Standco Brake Lining Co. ... —
*Star Drilling Machine Co. ... —
Straus-Bodenheimer Co. ... —

T

E. C. Tecktonius Manufacturing Co. ... —
*Templeton, Kenly & Co. ... —
Texaco Development Corp. ... —
The Texas Co. ... —
Texas Electric Steel Casting Co. ... —
The Thermoid Co. ... —
Thompson Tool Co. ... —
*Thornhill-Craver Co. ... —
*The Timken Roller Bearing Co. ... —
Edgar Tobin Aerial Surveys ... —
*Tretolite Co. ... 25
Trinity Portland Cement Co. ... —
Tulsa Shock Absorber Co. ... —
*Twin Disc Clutch Co. ... —

U

*Union Wire Rope Corp. ... 40
*Union Carbide & Carbon Corp. ... —
*Unit Rig and Equipment Co. ... Third Cover
*United States Rubber Co. ... —
United States Steel Corp. ... —
*Universal Atlas Cement Co. ... —
*Universal Engineering Co. ... —

W

P. A. Ward & Co. ... —
Warner & Swasey Co. ... 8
*Waukesha Motor Co. ... —
*Well Machinery & Supply Co. ... —
Well Surveys, Inc. ... —
Western Electric Co. ... —
*Westinghouse Electric & Manufacturing Co. ... —
*Wheeling Machine Products Co. ... —
*The Wheland Co. ... —
Wichita Engineering Co. ... —
*Wickwire Spencer Steel Co. ... —
*J. H. Williams & Co. ... —
*Wilson Manufacturing Co. ... —
*Wilson Supply Co. ... —
*Wisconsin Motor Corp. ... —
Witte Engine Works ... —
*Worthington Pump & Machinery Corp. ... —
Wyatt Metal & Boiler Works ... Fourth Cover

Y

Youngstown Sheet & Tube Co. ... —